THE IRON TRADE REVIEW

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OUR FIGHT FOR THE OPEN SHOP.

Monday morning, Oct. 30, the printers employed on all periodicals of The Penton Publishing Co. went on a strike, demanding an eight hour day, higher wages and the closed shop. As this paper has for years advocated the open shop, it would be rank treason to the cause of free labor for us to concede the demands which have been made. We, therefore, shall insist upon our right to employ whom we please. Publication under the present conditions is attended by much difficulty, and we believe it is not necessary to ask the indulgence of our readers and advertisers. We are confident of winning in the end, although it may be some time before all of the present difficulties are removed.

THE MARKET AT LARGE.

Pig iron has led the general iron and steel trade in point of activity, there being heavy sales of Alabama, Virginia, Ohio and Illinois iron. Sales of Bessemer include 20,000 to 25,000 tons to various consumers in the last three days of last week and 45,000 tons to the steel corporation this week, all at $16.50, valley, for delivery the balance of this year, and about cleaning up the available supply. It is rumored that the steel corporation has bought 40,000 tons of basic in the East. There is none available in the valleys, where three furnaces regularly making basic are out. In the Chicago district the Griffin Wheel Company bought 12,000 tons of charcoal and 9,000 tons of malleable Bessemer, while the Allis Chalmers Company took over 10,000 tons. Chicago district furnaces are asking $18.00 delivered Chicago for No. 2, an advance of 25 cents. Virginia producers are well sold up and have advanced 50 cents to $14.00 at furnace, the leading Virginia producer being sold to midsummer. The minimum at Birmingham is $13.50, most producers asking $14.00, and prompt iron is hard to buy in the south.

Selling of Lake Superior ore for next season has been started by one large interest at an advance of 25 cents per ton over last year, while other important interests are holding out for a 50-cent advance. This news is encouraging, as it dispels the fear that ore producers would hold out for a large advance, which might be dangerous to the future stability of the trade.

Demand for tin plate has improved very much. Several of the independents have withdrawn from the market at previous prices. The leading interest has started in the past fortnight 21 mills at Monessen, the remaining 10 at the Shenango works, New Castle, and 10 at the American works, Elwood, the latter constituting the first operations in the Gas Belt since midsummer. This interest is now operating fully 70 per cent. of its tin plate capacity, against 57 per cent. a fortnight ago, and is operating about 90 per cent. of its sheet capacity, which is substantially full.

Hoop tonnage has been coming in with a rush in the past ten days, and some interests favor an advance, but this move is not likely to prevail. In regular merchant bars, plates and shapes the tonnage is practically the same as last week, being beyond the capacity of mills. For the variety of shapes and sizes which would be required in an ordinary building specifications could not be gotten on the rolling lists of mills for earlier than the latter part of May, and delivery would not be guaranteed even for that time. The Pullman Company is figuring on 8,000 tons of shapes for car construction work.

Rail tonnage has been lighter than for several weeks past.

Fabrication of structural material now exceeds the current booking of new structural contracts by the leading interest, which has just taken the Ironton bridge contract, involving about 12,500 tons.

Car shortage is still more heard from and has impeded shipments of both crude steel and finished product. There is not hope of much relief as the advent of bad weather may more than counterbalance the release of cars now engaged in the coal and ore movement. The whole situation in the iron trade is ideal except for the menace of unduly high prices for coke and pig iron.

STRIKE IN PHILADELPHIA.

(Special Correspondence.)

PHILADELPHIA, PA., Oct 31.—Fifteen union foundries of this city are closed as the result of a strike of core makers backed up by a sympathetic strike of moulders a few days later. The core makers demanded an addition of 25 cents a day to their minimum wages of $2.50 which was refused. About 700 men are involved. The employers, who show no signs of yielding, are considering the advisability of adopting the open shop principle.

THE WEEK IN IRON CENTERS.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, October 30.

The chief change in the finished material situation is that the line which has been least active, tin plate, is showing more activity, with firmer prices. The leading interest in the past fortnight has started a total of about 40 addition tin mills, in three plants, one of these being in the Gas Belt and being the first gas belt mill to operate since midsummer. Most of the independent tin mills have marked up prices a trifle.

In other finished lines the situation is strikingly like it was at last report, the volume of new business and of specifications showing remarkably little change. With each passing week mills are sold farther ahead, the structural mills being in the lead. The assortment of shapes required for any fair-sized building could not now get on the rolling lists of the mills for before the latter part of May, and delivery would of course not be guaranteed for that time.

The coke question continues to cause considerable concern. It is emphatically denied in several quarters that any deal has been made between the steel corporation and the Rainey interest for coke for the first half of next year, or for any other period. Be this as it may, it is a fact that the advent of several new buyers in the Connellsville market, comprising steel concerns which either have failed to utilize outside coke or have increased their requirements, would account for the prospective scarcity. Standard Connellsville furnace coke is very firm at $3.00 on contract for any part or all of next year, and prompt coke is held at a slightly higher figure.

Deliveries of coke, steel and finished material are considerably hampered by a short car supply, and the situation promises to become much worse with the advent of colder weather.

Pig Iron.—Nearly 75,000 tons of standard Bessemer pig have been sold in the local market since last report. In the last three days of last week between 20,000 and 25,000 tons were sold to various outside interests, all at $16.50, valley, and this week the United States Steel Corporation took 45,000 tons at the same price, 25,000 tons from the Bessemer Furnace Association and 20,000 tons from W. P. Snyder & Company. All this iron was for delivery November and December and practically cleans up the available Bessemer for such delivery. Furnaces are not disposed to consider the question of prices for next year and so far as known no options whatever have been given. Sales of basic have been quite light for a couple of weeks, and there appears to be very little of this grade available for this year, particularly since the Struthers furnace had an explosion last Sunday, is now out, and may have to be relined. It was running on basic last week. Foundry iron is being marked up by furnaces without any large sales having been made. All prospects now are that pig iron will be much higher this winter as furnaces are well sold up at their normal capacity and are likely to have a great deal of trouble from car shortage, scarcity of coke, etc., while there must necessarily be some demand for small lots right along. While consumers of foundry iron in other districts are pretty well covered through the first quarter or first half of next year, Pittsburg consumers are not nearly so well covered. We revise prices as follows:

Bessemer, Valley	$ 16.50
Bessemer, Pittsburg	17.35
No. 1 Foundry, Pittsburg	17.35 to 17.85
No. 2 Foundry, Pittsburg	16.85 to 17.35
Gray Forge, Pittsburg	15.85 to 16.10
Basic, Valley	16.50
Basic, Pittsburg	17.35

Ferro-Manganese.—There is very little ferro available for this year's delivery, and it is being held at from $63 to $65 according to tonnage and time of delivery. There are no regular quotations for next year.

Billets.—Almost any price could be obtained for open-hearth steel, consistent with the consumer's ability to pay. There is not much Bessemer, but enough to establish a market at $26 Pittsburg, for billets or slabs. We quote open-hearth billets nominal at $27 to $29. Sheet bars are nominally $27, Pittsburg, there being no sales of consequence since about all consumers are covered by contracts of one sort or another.

Muck Bar.—There is some enquiry and prices are very firm at $28.50, mills being well sold up through this year.

Skelp.—There is scarcely any skelp available for this year and not much is being done in the market. Prices remain as follows:

Bessemer steel, grooved, 1.55c; sheared, 1.60c; open-hearth, grooved, 1.60c; sheared, 1.65c; iron, grooved, 1.60c to 1.65c; sheared, 1.65c to 1.70c.

Rails and Track Material.—There has been a slight lull in rail booking locally, the last business of importance having been the Baltimore & Ohio order, which is closed except as to some minor details. Light rails remain very firm, with premiums for early delivery. We quote prices on regular delivery unchanged as follows:

Fifty pounds and heavier, 500-ton lots and over, $28; carload lots and less than 500 tons, $30; less than carload lots, $32; light rails, 16-lb., $29 to $30; 20-lb., $27.50 to $28; 25 to 45-lb., $26; angle bars for standard sections, 1.50c; spikes, $1.90 to $1.95.

Plates.—Tonnage of plates continues to come in very freely, there being no change at all in the volume, as compared with last week. The large mills are booked far ahead and cannot make any early deliveries, orders for early delivery going to eastern mills at premiums. Mill prices continue unchanged as follows:

Tank plate, ¼ in. thick, 6¼ in. to 100 in., 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 lb.: Flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. in width, not less than 5c extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, 10c extra; guages 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

Merchant Bars.—Tonnage in hoops has shown a great increase in the past ten days, prior to which time it had been a trifle light. Nearly all the tonnage now being turned out by the mills, or about to be turned out, is at the advanced price recently established of 1.75c, there being but a few contracts running at the old price, with consumers the nature of whose business required that they be protected to the end of the year. The tonnage in hoops is so satisfactory that there is an inclination on the part of some mills to advance prices, but it is not likely that anything will be done for a while yet at any rate. In merchant bars the tonnage is large, and practically the same as for the past week or two. Here and there premiums are being paid on small lots for immediate shipment. There is some inconvenience from a shortage of cars for making shipments. It is not likely that any change in prices will be made in the near future. The mills are strictly set against the old idea of advancing prices to encourage specifications, as they are drawing strict contracts and will get the specifications in any event. Common iron bars are higher, and we now quote the market at 1.75c, Youngstown, or 1.79¼c, Pittsburg. The leading interest for nearly two weeks has been quoting 1.80c, Youngstown, on all enquiries. Iron bars show a rather large spread now above steel bars, and would doubtless be put still higher if steel bars were advanced. We quote iron bars $1.00 a ton higher and other prices unchanged, as follows:

Common iron bars, 1.75c, Youngstown; 1.80c, Pittsburg; hoops, 1.75c, and bands, 1.50c; taking hoop and band extras, respectively. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angels, zees and tees under 3 in., 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Structural Material.—The tonnage of new business shows no change from last week, continuing very large, so that each week mills are farther and farther behind. There is a greater proportion of specifications to contracts than ever before in the history of this line. Mills are specified farther ahead on some shapes and sizes than on others, but as a general proposition it can be said that the shapes for an ordinary building could not all get on the rolling lists of the large mills for earlier than the latter

part of May, and delivery at that time would only result if everything worked without a hitch, the mills not being willing to make any guarantee whatever except that they will fill the specifications in the arranged order. Fancy prices are paid for small lots from stock. Regular mill prices are unchanged as follows:

Beams and channels, 15 in. and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles, from 3 to 8 in. inclusive, 1.70c; universal and sheared plate, 6¼ in. and wider, 1.60c, base.

Pipes and Tubes.—The market continues in very satisfactory condition. Much of the line pipe which has lately been figured on will likely go over, on account of the extreme lateness of the season, but with the contracts already taken, and the excellent prospects, the line pipe business is regarded as in very good shape. Oil country goods continue to move more freely. Business in merchant pipe is good to mills and jobbers and the market is very firm, all low prices being withdrawn.

We quote discounts in car lots to consumers as follows, prices to large jobbers being one point lower:

	Steel		Iron	
Consumers Carloads	Black	Galv.	Black	Galv.
⅛ and ¼ inch	71	55	68½	52½
⅜ and ½ inch	75	63	72½	60½
¾ to 6 inches	79	69	77	67
7 to 12 inches	74	59	72	56½
EXTRA STRONG PLAIN ENDS.				
⅛ to ¾ inch	64	52	61½	49½
¼ to 4 inches	71	59	68½	56½
4½ to 8 inches	67	55	64½	52½
Double extra strong plain ends, ½ to 8 inches	60	49	57½	46½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.	Steel	Iron
1 to 1½ inches	44	41
1¾ to 2¼ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

Less than carloads, two points less.

Sheets.—The sheet market is still firmer, and specifications are coming in to the mills more freely than for a long time. The leading interest is operating about 90 per cent. of its sheet capacity, which is practically full, as some mills must always be off for repairs, etc., and in view of the scarcity of crude steel it is excellent practice to operate so nearly to theoretically full capacity. The independents are doing very well, and the majority of them have withdrawn from the market at minimum prices, in many cases turning down firm offers at slight advances. Demand for special sheets, magnetic, stamping, etc., is particularly heavy and deliveries are not entirely satisfactory. It is reported that the spread between black and galvanized is a shade less in some cases than it has regularly been of late. New business to the mills is scarcely as large as it was, most buyers having contracted ahead to about the end of the year, but specifications are distinctly better. Demand from jobbers also shows an improvement. The absolute minimum of the market on the largest tonnages, most favorable contracts and to the best buyers is 2.20c on black and 3.25c on galvanized, No. 28 gauge, f. o. b. Pittsburg. On single carloads, for mill shipment, the market is easily $1.00 a ton higher, while in many cases $2.00 a ton higher is paid for any prompt delivery.

We quote the official prices as follows, these being quite nominal but well representing the differentials between gauges:

No. 30, 2.65c; No. 29, 2.55c; No. 28, 2.40c; No. 27, 2.30c; Nos. 25-26, 2.25c; Nos. 22-24, 2.0c; Nos. 17-21, 2.15c; Nos. 15-16, 2.10c; Nos. 13-14, 2.05c; Nos. 10-12, 2c. Galvanized, Nos. 10-11, 2.35c; Nos. 12-14, 2.45c; Nos. 15-16, 2.55c; Nos. 17-21, 2.70c; Nos. 22-24, 2.85c; Nos. 25-26, 3.05c; No. 27, 3.25c; No. 28, 3.45c; No. 29, 3.70c; No. 30, 3.95c. Quotations f. o. b. Pittsburg, 30 days net, 2 per cent off cash 10 days.

Wire and Wire Nails.—Demand for nails is excellent and new business is being entered by mills at the present official prices, despite the fact that there was heavy covering before the last advance. Demand from jobbers is excellent, and they are making every effort to keep up stocks. While shipments from mills are somewhat hampered by car shortage, the month's shipments show up very well, and may constitute a record breaker. Barb wire and plain wire are in equally good condition. Even in the regular competitive districts prices are pretty well maintained. It is reported that there is a little cutting in the east, from stocks. Official prices, which are being strictly maintained by the mills, continue as follows:

Wire nails jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in 10 days. Iron and steel cut nails, $1.70 to $1.75.

Merchant Steel.—Agricultural steel has been bought very freely and the mills are sold full for several months to come. Specifications are excellent and some consumers are not getting as good deliveries as they would like. Prices are unchanged as follows:

Cold rolled and ground shafting, 50 percent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 2.0c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c; to 1.55c; smooth finisned machinery steel, 1.70c to 1.75c; toe calk, 2c to 2.05c.

Old Material.—While there have been no sales of great consequence, the whole tone of the market is firmer, due to so little scrap coming out, the advance in pig iron, and the belief, generally entertained among dealers at least, that scrap prices are going to be much higher before the close of the year. In heavy melting stock there have been no sales of consequence since the ones already reported which put the market at $17.00, delivered. This price is now being bid by dealers who either desire to fill short contracts, or expect to make sales shortly at better than this price. There have been no important sales of cast scrap, but in view of the sharp advance in pig iron (Bessemer being squarely $16.50, valley, with sales of about 70,000 tons in the past week at this price) No. 1 cast scrap is regarded as easily worth $16.00. Sheet scrap is $14.50 to $14.75, cast borings $10.25 to $10.75, No. 1 wrought $20, low phosphorus scrap, $20 to $21 and rerolling rails $17.50 to $18.

Coke.—There are prospects that coke will sell at fancy figures this winter, as there are great dangers of a serious car shortage, when there will be an unprecedented demand for cars in the Connellsville region. Contracts have been made at $3.00 for strictly Connellsville furnace coke for the entire year 1906, and it is doubtful whether this figure could be done now. Prompt coke is scarcely quotable at all, quotations ranging from $3.15 up. Strictly Connellsville 72-hour foundry coke is $3.50 to $4.00, the latter being the minimum of some sellers, for prompt shipment. Production for the week ending October 21 is estimated at 274,603 tons in the Connellsville region and 88,993 tons in the lower Connellsville region, showing practically no change in the Connellsville region and a gain of about a thousand tons in the lower region from either of the two previous weeks.

THE GRAHAM PHILLIPS HORSE SHOE & IRON CO.

The Graham-Phillips Horse Shoe & Iron Co., is a new Cincinnati concern, incorporated at Columbus, Ohio, on Oct. 25, with the declared purpose of manufacturing horse shoes, bar iron and steel. The company is incorporated for $200,000, and all of the stock has been subscribed. The organization meeting was held on Oct. 28, in the offices of the company, at 210 Traction Building, and the following officers were elected: C. E. Hooven, president; H. Lee Early, vice-president; Frank C. Graham, secretary and treasurer; Charles G. Phillips, general manager. The Hooven interest is well known in the iron business, being closely associated with Hooven, Owen & Rentschler, founders and machinists of Hamilton, Ohio. Mr. Graham has been the western representative of several large eastern mills for a number of years. Mr. Phillips has been connected with rolling mills and steel plants in the east as superintendent and general manager for the past 25 years.

The company has secured a tract of 60 acres on the Big Miami river, near Cleves, Ohio, and is on the line of the C. C. C. & St. L. Ry., and the Cincinnati, Lawrenceburg & Aurora Traction line. Plans will be drawn at once for the buildings, and the officers expect to have the plant in operation by April 1.

The company will have its property platted into a town site, and a name will be selected for the locality. It is the intention of the officers to make only the bar iron and steel necessary for the making of their horse shoes; they do not expect to make this product for the market. The Cincinnati Industrial Bureau was largely instrumental in having the plant located in Cincinnati.

J. R. Haynes, for years connected with the purchasing department of the Chicago, Burlington & Quincy Railroad, with headquarters in Chicago, has been appointed assistant purchasing agent of the entire system, effective November 1st.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, October. 31

There is no abatement in the demand for iron and steel. Pig iron was again to the front last week in point of activity. One transaction involved 21,000 tons of charcoal and malleable Bessemer; another, 10,000 tons of mixed grades; while another, yet to be closed, calls for 15,000 tons. These with a heavy run of small orders has added increased strength to the market and resulted in making what were maximum prices last week the minimum this week. Southern No. 2 Foundry is now selling at $17.65 to $18.15 Chicago, and Lake irons at $18 to $18.50 for the same grade. Further withdrawals from the market have occcurred, the most interesting in this connection being the announcement of the leading Virginia producer that it has sold its entire output of No. 2 foundry for the first half of 1906. Specifications and new business for rolled materials are without diminution, being continually in excess of the capacity of mills. Railroad activity is the most pronounced in this respect and fully substantiates the statement made by E. P. Harriman last week that we are entering upon a period of railroad construction which will last an indefinite length of time. The Pullman Company has taken contracts for 14,000 cars and is now figuring with the Corporation for the 8,000 tons of steel required in their construction. About 40,000 tons of standard rails were placed with the local mill last week; while the new tonnage in spikes, angle bars and light rails was over 50 per cent the output of mills. Iron and steel bars are moving freely, the consumption being limited only by the supply. Sheets remain weak, and $2.20 Pittsburg for No. 28 gauge is commonly done. Coke is very firm and scarce, $6.15 being the absolute minimum at which standard Connellsville foundry grades are offered in this market. Wire continues in excellent demand, though sellers look for a falling off in November. Scrap is quiet and prices stationary.

Pig Iron.—Trading last week was of a nature to recall the activity of a few weeks ago. Prices stiffened under the steady buying and became so firmly fixed at $14 Birmingham for No. 2 that one large Southern producer which had been out of the market for several weeks reopened its books for new business. A large wheel manufacturer bought 12,000 tons of Lake Superior charcoal and 9,000 tons of malleable Bessemer, and a Milwaukee machinery firm about 10,000 tons of various Northern and Southern grades. There are other inquiries pending, ranging from 15,000 tons downward, callng largely for basic, charcoal and malleable irons. Under this impetus of buying, Northern irons have advanced to a minimum of $18 Chicago for No. 2, with not a few sellers asking $18.50. Charcoal and malleable irons have also advanced 50 cents a ton each, and are now offered at $18.50 and $18 Chicago respectvely. The withdrawal from the market of the leadng Virginia interest on No. 2 foundry for the first half of next year, has greatly strengthened the product of that state and one interest is asking $16 furnace for No. 2 foundry. The general price, however, is $15.50 furnace, or $18.15 Chicago. Some trouble is expected with the coal miners in Virginia, and in anticipation of a strike, furnacemen are securing options on large tonnages of coke for quick shipment. The freight rate advance of 20 cents a ton which the Chesapeake & Ohio announced it would put into effect Nov. 1 has beeen postponed to January 1st. On and after that date, the rate to Chicago will be $2.80. We have revised our quotations as follows:

Lake Superior charcoal	18.50
Northern Foundry No. 1	18.50 to 19.00
Northern Foundry No. 2	18.00 to 18.50
Northern Foundry No. 3	17.50 to 18.00
Northern Scotch Foundry	18.50 to 19.00
Ohio Strong Softeners No. 1	18.30 to 18.80
Ohio Strong Softeners No. 2	17.30 to 17.80
Southern Foundry No. 1	18.15 to 18.65
Southern Foundry No. 2	17.65 to 18.15
Southern Foundry No. 3	17.15 to 17.65
Southern Foundry No. 4	16.90 to 17.40
Southern No. 1 Soft	18.15 to 18.65
Southern No. 2 Soft	17.65 to 18.15
Southern Gray Forge	15.65 to 16.15
Southern Mottled	15.40 to 15.65
Southern Silveries (4 percent to 6 percent Silicon)	18.15 to 18.65
Jackson Co. Silveries (8 percent to 10 percent Silicon)	19.80 to 20.80
Alabama and Georgia Car Wheel	20.65
Malleable Bessemer	18.00 to 18.50
Basic Iron	18.15 to 18.65

Billets—An active demand is felt for forging and axle billets. Most of it has to seek other markets however, as only one local mill is in position to make shipments. The Illinois Steel Co. will have no billets to sell until its new open hearth plant is completed, and this will take at least six months. Forging billets are quoted locally at $32 to $35, according to tonnage and delivery.

Bars—New business in iron and steel bars is of gratifying volume. Especially insistent is the demand for iron, which has increased beyond all expectations. The specifications and new tonnage from railroads and car bulders are the heaviest, these interests constantly soliciting anticipated shipments. Prices are very firm, 1.80c Chicago being the ruling quotation, though 1.75c can be done in some quarters on very desirable busness. The consumption of steel is almost on a par with iron, all the mills reporting that their order books are ahead of their capacity from 50 per cent to 60 per cent. Deliveries are slow, especially on large sizes. Prices are extremely firm, some jobbers and independent makers asking premiums of $2 a ton. We quote carload lots, mill shipments:, Chicago delivery, soft steel bars and bands, 1.66½c, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 1.91½c base, full extras. Hard steel angles, 1.60c to 1.65c. Demand from store is heavy and prices are firm. We quote bar iron, 1.95c to 2c base, full extras; soft steel bars and bands, 1.85c base, half extras; soft steel angles, channels and tees, under 3 in., 1.95c; hoops, 2.20c to 2.30c base, full extras.

Sheets—Demand during the week was light. Prices are slow to strengthen, and quotations as low as $2.20 Pittsburg for No. 28 guage are frequently heard of. Some mills have declined to meet these figures and have withdrawn from this market entirely. For the general run of business, however, we continue the following prices which are those of the more conservative houses and are for Chicago delivery and mill shipments: Blue annealed sheets, Nos. 9 and 10, 1.81½c; Nos. 11 and 12, 1.86½c; Nos. 13 and 14, 1.91½c; Nos. 15 and 16, 2.01½c. On box annealed, one pass, cold rolled, we quote: Nos. 18 and 20, 2.21½c; Nos. 22 and 24, 2.26½c; Nos. 25 and 26, 2.31½c; No. 27, 2.36½c; No. 28, 2.46½c; No. 29, 2. 56½c. We quote on lots from warehouse stocks, as follows: No. 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.25c to 2.30c; No. 16, 2.35c to 2.40c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.60c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.90c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.41½c; No. 16, 2.56½c; Nos. 18 and 20, 2.71½c; Nos. 22 and 24, 2.86½c; No. 26, 3.06½c; No. 27, 3.26½c; No. 28, 3.46½c; No. 29, 3.71½c. Jobbers' prices on small lots from store are as follows: Nos. 10 to 14, inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; Nos. 22 and 24, 3.25c; No. 26, 3.50c; No. 27, 3.70c; No. 28, 3.95c; No. 29, 4.40c; No. 30, 4.85c.

Structural Steel—New business is necessarily light, as

practically all the large buyers in this territory covered before the last advance went into effect. Inquiry, however, is heavy, and specifications voluminously so. The transaction of principal interest at the present time, is that of the Pullman Company which is figuring on about 8,000 tons of heavy material for car construction work. Prices are without change. We quote carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in., inclusive, 1.86c; angles, 3 to 6 in., 1.86c; angles larger than 6 in. on one of both legs. 1.96½c; beams larger than 15 in., 1.96½c; zees 3 in. and over, 1.86½c; tees, 3 in. and over, 1.91½c; with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. We quote prices from store as follows: Angles, 2.25c to 2.35c; beams and channels, base sizes, 2.25c to 2.75c; tees and zees, 2.30c to 2.35c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

Plates—The week has passed without any noteworthy development. There is a fair tonnage in new business constantly coming forward, but owing to the late deliveries which can be given, much that could be taken is withdrawn. Specifications are very heavy, many consumers asking that their requirements be anticipated. Prices are without change, and we quote mill shipments, Chicago delivery: tank steel ¼ in. and heavier, up to 100 in. wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Jobbers report a good movement from local stocks wth store prices firm. We quote on small lots as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c to 2.10c; over 72 in. wide up to 100 in., 2.10c to 2.20c; over 100 in. wide, usual mill extras, 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide, 2.35c; flange steel, 25c extra; heads, 25c extra.

Rails and Track Supplies—About 40,000 tons of standard sections were closed last week with Western and Southwestern roads by the local mill. These were supplementary tonnages to contracts already taken from these buyers, otherwise they would have been turned over to the Carnegie Steel Co. The demand for light rails and track supplies is very heavy, the total tonnage taken during October for these products being nearly 50 per cent in excess of the company's output. All prices are very firm but without change. We quote heavy sections in 500-ton lots, f. o. b. mill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails, f. o. b. Milwaukee mill: 12-lb. sections, $30; 16-lb., $29; 20-lb., $28; 25-lb., $27; 30, 35, 40 and 45-lb. sections, $25.50. Track supplies, f. o. b. Joliet, are as follows: Angle bars, 1.50c to 1.75c, according to tonnage; spikes, first quality, 1.85c to 1.95c; track bolts, 3¼ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts, 2.25c to 2.65c.

Merchant Steel—At the risk of tiresome repetition, we have to report only that mills continue out of the market so far as new business is concerned, and that specifications continually exceed the output. Prices are without change but firm. We quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21½c; railway spring, 1.86½c. Cold rolled shafting, 52½ percent off to dealers, 50 percent off in carload lots, and 45 percent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

Cast Iron Pipe.—New tonnage and specifications are of light volume. The falling off is not surprising as makers are now entering upon their dull season. Some shipments were made last week to jobbers and consumrs who are replenishing their stocks for next spring's consumption, but, generally speaking, there is a marked diminution of orders. Prices are without change, though advances are expected shortly in view of the rising cost of raw materials. We quote carload lots, f. o. b. Chicago: 4-in. water pipe, $30; 6, 8, 10 and 12-in., $29; larger sizes, $28.50; gas pipe, $1 extra.

Merchant Pipe.—The open weather that continues in all parts of the west is partly responsible for the active demand for pipe. Mills have booked a large tonnage of new business during October, and for this time of the year an unusually large amount of pipe has gone into consumption. It is not expected this volume will keep up after the advent of frost, though it has lasted longer than was expected, and, incidentally, has aided materially in stiffening an otherwise wobbly market. The leading interest is making no concessions from its published rate card, and neither are independent makers showing any disposition to recede from that basis. Mill discounts are given in our Pittsburg report. Chicago jobbers are quoting 76½ to 77 percent on ¾ to 6-in. black steel pipe.

Boiler Tubes.—The good demand for tubes that has kept up all summer continues without noteworthy dimunition and bids fair to last through the winter. The inability to get early deliveries from mills deflects considerable tonnage to jobbers, and the competition for this business has given rise to a slight shading of prices on certain sizes. It is not expected this will grow very serious as there is too healthy a demand to warrant its continuance. Mill prices are firmly adhered to and are without change. We quote carload lots, Chicago delivery, as follows:

	Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
			Up to 4½ inches 50.50
6 to 13 inches	52.35	37.35	

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

Wire Products.—All producers report a large tonnage on their books for the various firms of wire products. In some lines, notably nails and smooth wire, many have sold their capacity months ahead. A decrease in new business is looked for after the first of November, though it is expected a greater volume of specifications will follow. Prices are without change. We quote carload lots, mill shipments, Chicago delivery, to jobbers, as follows: Wire nails, $1.95; painted barb wire, $2.10; galvanized bard wire, $2.40; smooth annealed wire, $1.80; smooth galvanized wire, $2.10; polished staples, $2.10; galvanized staples, $2.35. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher.

Coke.—The local coke situation becomes more acute each week. So confident were the majority of melters in this district that as little difficulty would be experienced this wnter as last in getting all the coke they needed, that many neglected to care for their requirements. Last winter, coke was almost a drug on the market. This winter it bids fair to be as correspondingly scarce. Some Connellsville sellers are askng $4.00 at the ovens, or $6.65 Chicago, for standard 72-hour grades, though the average price is $3.75 ovens or $6.40 Chicago, with a few grades

offered at 25 cents a ton below this price. The possibilty of a strike among the miners in the coal fields along the Chesapeake & Ohio has endangered the coke supply of Virginia furnaces, and these interests are actvely securing other markets and securing options on their prospectve requirements. Local demand is very heavy, all that is offered being quickly snapped up. Many western melters are storing all they can get shipped, so doubtful are they of the season's supply. Prices are very firm and of an advancing tendency.

Old Material.—Scrap shows no gain in strength. On the contrary, slight recessions are noted in those products which enter largely into the manufacture of rolled materials. All the local and nearby mills are amply protected for months to come and buying only such metal as is offered at attractive prices. Many dealers have speculated heavily in the belief that still higher values would rule, but feeling the necessity of turning part of their stocks into cash have been forced to sell at a loss. The market, however, is quiet and steady, and enough sales have been made at top-notch prices to offset the weakness developed by the forced transactions in other quarters. A halt, however, has been called on those dealers whose tactics were forcing up prices beyond all reason, and it is believed the market will remain stationary, at least, for a few weeks as a result. The C. & N. W. list for 900 tons is the only one in the market this week, those of the "Q", C. & E. I. and Wabash having been bought up a week ago. Fancy prices were paid for the more popular grades of scrap in these lists, all the dealers being anxious to secure the same. We have revised our quotations this week. Old steel rails and old iron rails have each advanced 50 cents a ton. Railroad wrought, busheling, dealers' forge and wrought pipe have been reduced 25 cents each, and country sheet 50 cents a ton. We quote gross tons as follows:

Old steel rails (4 feet and over)	$16.00 to 16.50
Old steel rails (less than 4 feet)	16.00 to 16.50
Old iron rails	22.50 to 23.00
Relaying rails, subject to inspection	26.00 to 27.00
Heavy melting steel	15.00 to 15.50
Mixed country steel	12.50 to 13.00

We quote as follows net tons:

No. 1 R. R. wrought	17.00 to 17.50
No. 2 R. R. wrought	16.00 to 16.50
Shafting	18.00 to 18.50
Dealers' Forge, No. 1	14.00 to 14.50
Wrought pipe and flues	12.25 to 12.75
No. 1 cast, 150 lb. and less	14.00 to 14.50
No. 1 mill	9.00 to 9.50
No. 1 Busheling	12.25 to 12.50
No. 2 Busheling	11.75 to 12.25
Country sheet	8.00 to 8.50
No. 1 boilers, cut	12.00 to 12.50
Boiler punchings	14.50 to 15.00
Iron car axles	23.50 to 24.00
Steel car axles	18.00 to 18.50
Iron axle turnings	11.50 to 12.00
Cast borings	9.00 to 9.50
Mixed Borings, etc	9.00 to 9.50
Machine shop turnings	11.00 to 11.55
Railroad malleable	14.50 to 15.00
Agricultural malleable	13.50 to 14.00
Stove plate and light cast scrap	11.50 to 12.00
Old iron splice bars	19.00 to 19.50

Leading electrical manufacturing interests of Chicago have organized for the purpose of giving a trades exposition in the Coliseum in that city from January 15th to January 27th. It is more than fifteen years since an exposition of this kind was held in Chicago. Thomas Mercein, who has had a wide and successful experience in the management of enterprises of this character, is general manager, with offices at 446 Monadnock Building. During the progress of the show, meetings of various technical clubs and associations will be held at the Coliseum, among those that have promised to attend being the National Association of Independent Telephone Manufacturers; the Northwestern Electrical Association, and the Electrical Salesmen's Association.

CINCINNATI.

Pig Iron.—The market is strong and has advanced about 50 cents per ton on southern iron the past week. Sales have been moderate, but there have been a few round lots booked. Pipe makers are again in the market and have taken considerable iron. The offerings of spot iron are cleaning up, but this class of iron is difficult to sell and is sold at prices lower than iron for forward delivery. Southern iron is now firm at $13.50 to $14.00 for No. 2 foundry, Birmingham basis. Northern iron is firm at $16.00 to $16.50 at Southern Ohio furnace. Consumers are taking iron on contracts freely and some are asking to have shipments rushed. Southern furnaces are maintaining a strong position and the number of those that are asking $14.00 Birmingham or have with drawn from the market is increasing. We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$16.75 to 17.25
Southern Foundry No. 2	16.25 to 16.75
Southern Foundry No. 3	15.75 to 16.25
Southern Foundry No. 4	15.25 to 15.75
Southern Foundry No. 1, soft	16.75 to 17.25
Southern Foundry No. 2, soft	16.25 to 16.75
Gray Forge	14.75 to 15.00
Northern Foundry No. 1	17.65 to 18.15
Northern Foundry No. 2	17.15 to 17.65
Northern Foundry No. 3	16.65 to 17.15
Jackson County Silvery, 8 percent	19.15 to 19.65
Southern Charcoal	19.00 to 19.25

Finished Material.—A firm tone prevails and prices are well maintained. The demand is good and business continues active. Bar iron is quoted at 1.70c to 1.75c; steel cars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets, No. 10 and No. 12, in car lots are 2.48c. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2s. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.50c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe there is no change and the market is steady at previous quotations. We quote f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ and ¼ inches	69.7	53.7	67.2	51.2
⅜ and ½ inches	73.7	61.7	71.2	59.2
¾ to 6 inches	77.7	67.7	75.7	65.7
7 to 12 inches	72.7	57.7	70.7	55.2

Coke.—The demand continues active and the market is strong, with some prices higher than a week ago. Some furnace interests are seeking to cover their wants for the first half of next year, but it is difficult to get ovens to quote. Foundry coke continues firm and the ruling quotation is $4.00 per ton in the Virginia and Connellsville districts. Prices in the various coke-producing districts are as follows:

†Wise County, Va. Furnace Coke prompt shipment	$2.75	to 3.00	per ton
Wise County, Va. Foundry Coke prompt shipment	3.75	to 4.00	per ton
Pocahontas Furnace Coke on contracts	....	to	per ton
*Pocahontas Foundry Coke on contracts			
Connellsville Furnace Coke prompt shipment	3.00	to 3.25	per ton
Connellsville Foundry Coke prompt shipment	3.75	to 4.00	per ton
Kanawha Furnace Coke on contracts			
Kanawha Foundry Coke on contracts	....	to	per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

Old Material.—With the advance in pig iron, scrap

prices are strong and advancing. There is also a better demand from meters. We quote:

Old No. 1 railroad wrought, net tons	$17.50 to 18.00
Cast machine and foundry, net tons	13.50 to 14.00
Old iron rails, gross tons	22.50 to 23.50
Old steel rails, gross tons	16.50 to 17.00
Old short lengths, gross tons	17.50 to 18.00
Old iron axles, net tons	22.50 to 23.50
Stove plate, net tons	10.50 to 11.00
Wrought turnings, net tons	11.00 to 12.00
Cast borings, net tons	9.00 to 9.50
Car wheels, net tons	16.00 to 16.50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., October 30.

Pig Iron.—Sales of Foundry iron have been light as compared with recent weeks, owing partly to the inability of producers to supply material and also to the failure of consumers to find willing sellers. Consumption maintains enormous proportions, and many foundries are still anxious to cover requirements for the first half of next year, and there are always sporadic demands for odd lots of spot. The general foundry business is still increasing in volume and consumers are constantly requesting producers to anticipate shipments. Interest is beginning to extend to third quarter delivery, several of the sales reported this week being for shipment after March. Basic iron has held the center of the stage this week, the only really large transactions in the Eastern section being confined to this class. Most of this business was transacted in Philadelphia, but a fair proportion fell to the local agents. Among the contracts closed by New York representatives were 3,000 tons of Alabama basic and 2,500 tons of foundry iron, equally divided between Northern and Southern furnaces, the latter to be delivered to J. M. & J. B. Cornell. A number of small orders for 100 and 250 ton lots were placed. Inquiry although not as active as last week is still sufficient to relieve the market of dullness. The following are prices at tidewater:

Northern No. 1 Foundry	$18.00 to 18.25
No. 2 Foundry	17.50 to 17.75
No. 2 Plain	17.00 to 17.25
No. 1 Southern Foundry	17.75 to 18.00
No. 2 Southern Foundry	17.25 to 17.50
No. 3 Southern Foundry	16.50 to 16.75
No. 4 Foundry	16.00 to 16.50

Pig Iron Certificates.—The market at the New York Produce Exchange has been quiet but firm. Considerable activity developed Saturday when the following sales took place: 100 tons of February foundry, at $16.70; 200 tons February, at $16.65; 200 tons December, at $16.50; 600 tons February regular, at $16.60; 200 tons of the same classification and also for February delivery, at $16.70. In warrants 500 tons calling for basic iron were sold at $16.45. Foundry iron warrants follow:

October	16.10	——
November	16.30	——
December	16.50	17.00
January	16.65	——
February	16.50	——

Finished Iron and Steel.—Although the demand upon the mills continues to be urgent, the period of phenomenal sales in the steel trade seems to be over for the present. Railroads are in no haste to cover their remaining requirements, although large tonnages still remain to be placed. In the structural material market the difficulty of securing shipments is as serious as ever, although the mills are now turning out more than is being sold during the same period. The shops of the American Bridge Co., will, within the near future, be in condition to turn out 50,000 tons of structural shapes per month. That at Ambridge alone will have a capacity of 20,000 tons; it is now in its uncompleted state, producing three-fourths of that amount. The contract for the Ironton Bridge, which will require 12,500 tons of material, has at last been closed. This was secured by the American Bridge Co. Other contracts allotted to independent builders for office and hotel structures will also result in orders for material from the same firm. A very large business is still in prospect, but how long it will be delayed by the inability to secure material no one can predict. Stored supplies of material are now pretty well exhausted, all producers being on practically the same footing. The demand for billets exceeds the supply, and premiums are the rule rather than the exception. Plates are quite as active as last week, the orders for new cars, which are piling up at an unprecedented rate, being alone sufficient to create a brisk demand. Sheets are still unaccountably dull.

The following are prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.84½c; beams, 3 to 15 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary fire box, 1.94½c; refined iron bars, 1.60c; soft steel bars, 1.64½c to 1.79c; sheets in carload lots, New York, No. 28, black, 2.40c.

Old Materials.—The only change of note since last week is an improved demand for wrought material, prices for which are tending upwards. Steel scrap is receiving the most attention and prices are, if anything, a shade higher. Holders of all classes of material are alive to the fact that the market is in their favor, and are, in consequence, not anxious to sell, being sometimes willing to pay more than consumers. The result is that actual transactions are not large. The railroads are the principal sellers at the present time. The following prices are f. o. b. approximately, at tidewater:

Old iron rails	$22.50 to 23.50
Old steel rails (over 6 feet)	16.00 to 17.00
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	16.00 to 16.50
Steel boiler plate	13.50 to 14.50
Steel axles	19.50 to 20.50
Malleable iron (railroad)	16.00 to 17.00
Malleable iron (agricultural)	15.00 to 16.00
Heavy steel	16.50 to 16.75

We quote as follows, net tons:

No. 1 R. R. wrought	17.50 to 18.00
No. 1 busheling	14.00 to 15.00
No. 1 machine cast	13.75 to 14.25
Iron axles	22.50 to 23.50
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	9.00 to 9.50
Pipes and flues	13.00 to 14.00
Tank iron	11.00 to 11.50
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	10.50 to 11.00
Cast borings	8.50 to 9.50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
Browning Building, October 31.

Iron Ore.—Complete statistics of shipments for the month of October are not yet available, but ore has been coming down at a rapid rate, and it is believed that the shipments will aggregate about 4,200,000 tons. There have been rumors of advances of ore freights, including one report that a furnace company had offered $1 per ton for the carrying of 17,000 tons of ore from Escanaba to Buffalo, an advance of 40 cents over season contract rates. It is probable that there will be some advance in freight rates, but it is evident that much of the bullish talk heard within a few days has little foundation. Vessel owners have been rushing shipments of contract ore as fast as possible, and some of them have already finished the

shipments of such ore. Although the demand for vessels for grain is heavy, it is not anticipated that there will be much difficulty in getting tonnage for all the ore to be shipped.

Some ore has been sold for 1906 at an advance of 25 cents over the price of this year, when old range Bessemer was sold at $3.75, Mesabi Bessemer at $3.50, old range non-Bessemer at $3.20, and Mesabi non-Bessemer at $3. The advance is not uniform, however, as Mesabi non-Bessemer and old range non-Bessemer have been sold at the same price. The tendency for a number of years has been toward a decreasing differential between old range and Bessemer ores. In 1902 there was a differential of $1; in 1903 it was 50c, and during 1904 and 1905 it has been only 20 to 25c. Some of the large producers do not recognize the new quotations as fixing the price for 1906, and are insisting upon an advance of 50c per ton.

Pig Iron.—There has been little buying of pig iron and prices are higher; the usual quotations being $16.50 valley for basic and Bessemer, and $16.50 to $17 valley for No. 2 foundry.

Bessemer	$ 17.35
No. 1 Foundry	18.00 to 18.50
No. 2 Foundry	17.35 to 17.75
No. 3 Foundry	16.50 to 16.75
No. 2 Southern	17.35 to 17.85
Gray Forge	16.00 to 16.50
Gray Forge, Southern	15.75 to 16.25
Lake Superior charcoal	18.00 to 18.50

Finished Material.—The market continues strong and with little change. Evidence is accumulating that strong conservative interests will insist upon no advance in price of steel bars.

Old Materials.—The demand is heavy with prices firm and advancing especially in iron rails, iron and steel axles and machine cast. The rise in prices has continued without a break for the past two months and the crest has apparently not yet been reached. The car shortage is interfering considerably with prompt shipments. We quote, Cleveland delivery, as follows:

Old iron rails	$ 23.00 to 24.00
Old steel rails (over 6 feet)	16.00 to 17.00
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	16.00 to 16.50
Steel boiler plates	13.50 to 14.50
Steel axles	20.00 to 21.00
Malleable iron (railroad)	16.00 to 17.00
Malleable iron (agricultural)	15.00 to 16.00
Heavy steel	16.50 to 16.75

We quote as follows, net tons:

No. 1 R. R wrought	17.50 to 18.00
No. 1 busheling	14.00 to 15.00
No. 1 Machine cast	14.50 to 15.00
Iron Axles	23.00 to 24.00
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	9.00 to 9.50
Pipes and flues	13.00 to 14.00
Tank iron	11.50 to 12.00
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	11.00 to 11.50
Cast borings	8.50 to 9.50

PHILADELPHIA.

October 30

Pig Iron.—With the exception of a further stiffening in prices, little change from last week is to be noted. The orders being placed continue very large, but there is less of the excited buying that was so noticeable a few weeks ago. Some large producers, having covered their requirements in coke and ore, are selling as far ahead as July, 1906, but generally there is a disposition to be conservative about deliveries beyond the first quarter. The prediction is made by some that November will be a rather quiet month, to be followed in all probability by a burst of fresh buying in December, that will force prices materially higher. Basis, No. 2, foundry and No. 2 plain seem to be most in demand but prices for all grades are very strong, and sellers refuse to make any concessions from their figures. Quotations, which show a steadily advancing tendency, are about as follows:

No. 1X Foundry	$18.00 to 18.50
No. 2X Foundry	17.75 to 18.25
No. 2 Plain	17.25 to 17.75
Standard Gray Forge	16.00 to 16.50
Basic	17.50 to 18.00
Low Phosphorus	22.00 to 23.00
Southern No. 2X, rail	17.50 to 18.00
Southern No. 2X, dock	17.00 to 17.50

Finshed Material.—There is no let-up in the volume of business that pours in upon the mills, with structural material and plates most in demand, as they have been for some months. Bar iron is more active, and prices for reasonably prompt delivery, as measured by premiums, have an upward inclination. Nominally they remain unchanged as follows: Beams, channels and angles, according to specifications, 1.83½c to 2.50c; refined iron bars, 1.63½c to 1.80c; steel bars, 1.63½c to 1.83c; plates, 1.73½c to 1.80c.

Old Material.—The past week has witnessed a continuation in certain lines of scrap of the advance in prices noted for the previous week. This is based upon a more active demand from the mills, in conformity with the general condition of the trade. Prices may be quoted as follows:

Old steel rails	$17.00 to 18.00
No. 1 steel scrap	17.25 to 18.00
Old steel axles	21.50 to 22.00
Old iron axles	26.50 to 27.50
Old iron rails	24.00 to 24.00
Old car wheels	16.75 to 17.50
Choice scrap, R. R. No. 1 wrought	22.50 to 23.50
No. 1 yard scrap	19.25 to 20.00
Machinery scrap	16.00 to 16.75
Low phosphorus scrap	21.50 to 22.50
Wrought iron pipe	16.50 to 17.00
No. 1 forge fire scrap	16.50 to 17.00
No. 2 forge fire scrap, ordinary	13.50 to 14.00
Wrought turnings	14.00 to 14.50
Axle turnings, heavy	15.50 to 16.00
Cast borings	10.25 to 10.75
Stove plates	13.00 to 13.50

BIRMINGHAM.

BIRMINGHAM, ALA., Oct. 30.—The feature of the week has been the sale in small lots of No. 2 Foundry iron on the basis of $14.00, although the usual price is fifty cents lower. The extremely small available supply in the face of an insistent demand, however, lends color to the prediction of $14.50 to $15.00 iron by December. The railways and manufacturers are cooperating in an effort to relieve the car famine and with good results.

The Tennessee Coal, Iron & Railroad Co. is to build during the next year a large cast iron pipe plant at Ensley, where its proposition to rebuild all its blast furnaces is being carried out. These improvements will give it a daily output of about 2,000 tons of iron. The American Cast Iron Pipe Co. has broken ground at North Birmingham for its new plant, which is to be completed by May.

The steel situation is unchanged. Foundry and machine shop trade is flourishing, and the "open shop" plan is proving a success despite the strenuous opposition of the unions.

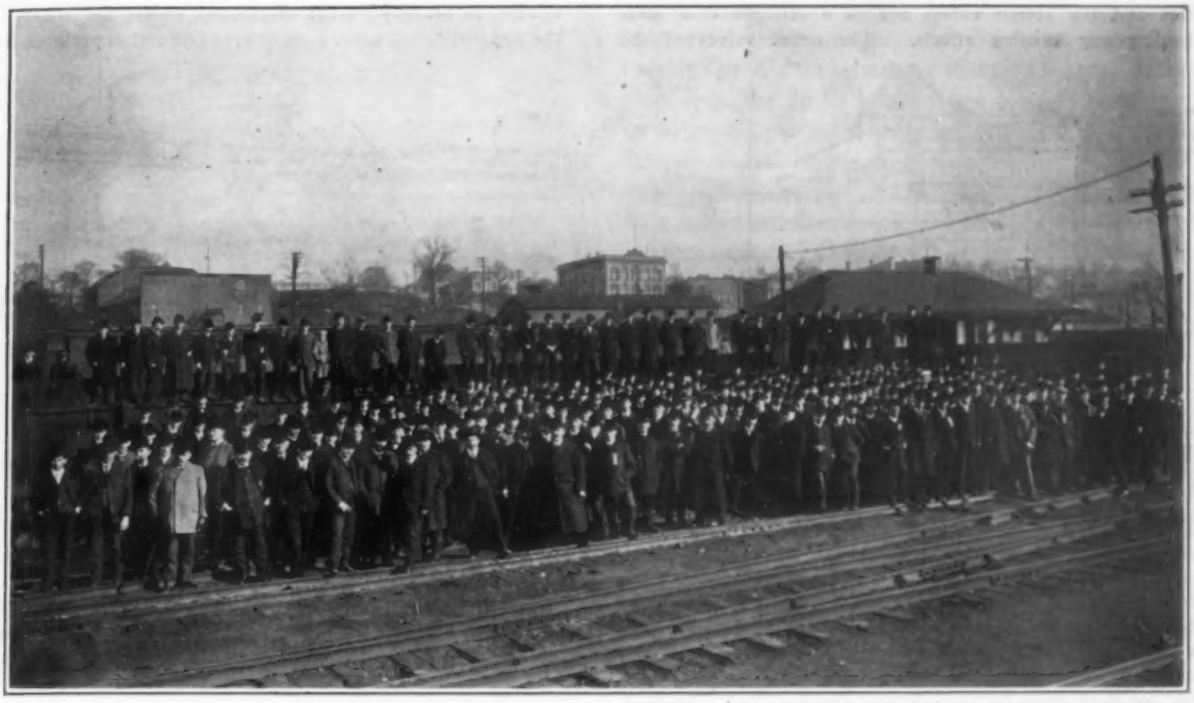
The Rail Joint Co. Troy N. Y., has been incorporated to manufacture, buy and sell rail joints, step joints, insulated joints, etc. The capital stock is $1,500,000.

The Fosdick Machine Tool Co., Cincinnati, O., has been succeeded by a new company bearing the same name but capitalized at $100,000, a $40,000 increase. Philip Fosdick has retired from active service in the company but retains his financial interest.

The Capewell Horse Nail Co., Hartford, Conn., has acquired the control of the Maritime Nail Works, St. John, Nova Scotia. This action was forced by the Canadian tariff which was particularly prohibitive against the products of the Hartford plant.

EXCURSION TO SHARON BY THE ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.

Mackintosh, Hemphill & Co., Pittsburg, tendered on Saturday, Oct. 28, a complimentary excursion to the Engineers' Society of Western Pennsylvania, to Sharon, Pa.



THE GUESTS AT SHARON.

More than four hundred members of the Association accepted the invitation and joined in the hearty hospitality extended. The visitors arrived at South Sharon shortly before three o'clock, having come from Pittsburg on a special train of nine coaches. The engineers visited the wire mill, nail mill, the field and barb wire fence department of the American Steel & Wire Co., and the skelp mill, Blooming mill, open hearth furnaces and blast furnaces of the Carnegie Steel Co. Although interest centered in the blowing engines installed by the Mackintosh,

RECEPTION COMMITTE OF MACKINTOSH, HEMPHILL & CO.

Hemphill & Co., at the Carnegie Co.'s blast furnaces about three years ago, the hosts so arranged the visit that a large part of the time was devoted to other departments.

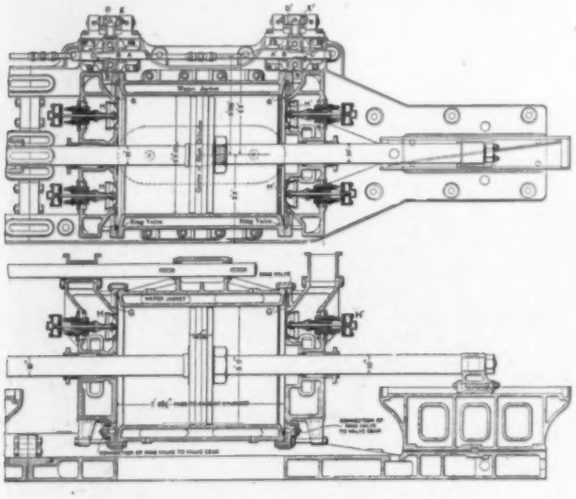
The blowing engines are horizontal Corliss cross-compound condensing engines. The engines are 77 feet 6 inches long over all, and the steam cylinders are 40 and 60 inches by 72 inches stroke. The air cylinders are 60 x 72 inches. The engine has a capacity of 30,000 cubic feet of free air per minute at a blast pressure of 18 pounds and steam pressure of 150 pounds. The speed of the engine is 60 revolutions per minute. If desired, the blast pressure can be increased to 25 pounds and the speed varied up to a maximum of about 70 revolutions per minute. The special feature of the engine is the provision for expan-

MESSRS. LEWIS, MCFADDEN, FAWELL AND HART.

sion and contraction, due to variations of temperature. The front part of the engine frame carrying the main bearings is connected to the blast cylinders by means of seven inch tie-rods at the top and by

means of the extended base of the blast cylinders at the bottom. The steam cylinders are connected to the front casting so as to be perfectly free to expand and contract longitudinally without affecting the engine.

The valves of the steam cylinders and the inlet valves of the compressors are operated by six separately adjusted eccentrics. The connections between the eccentrics and the steam valves are in a straight line, thus avoiding any twisting effects. The outlet valves of the

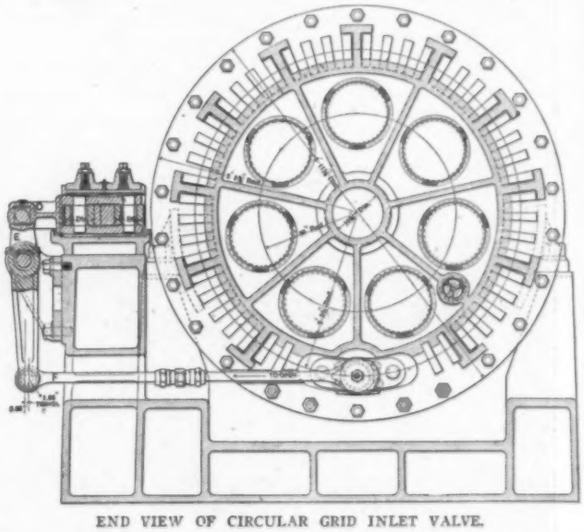


PLAN AND ELEVATION OF BLAST CYLINDER.

compressor cylinders are of the single poppet type and are each 12 inches in diameter. Each cylinder head is provided with seven of these valves arranged in a circle close to the piston rod. They are held on their seats by springs and are provided with dash pots to prevent slamming. The inlet valves are mechanically operated from the eccentric and are of the circular grid type. They are 5 feet 5 inches mean diameter and are set between the heads and cylinders and surround the space occupied by the outlet valves. The fly wheel is the built-up type and is 25 feet in diameter and weighs 40 tons. The crank discs are steel castings 86 inches in diameter. The total weight of the engine is 800,000 pounds. This engine was fully described in the issue of *Machinery* for June 1903, from which the accompanying illustrations are reproduced.

There are six of these engines installed at the Sharon works having an aggregate of 14,000 horsepower. All the engines were installed in 1903.

Representatives of the Mackintosh, Hemphill & Co., including Joseph Fawell, president; W. H. McFadden, vice-president and general manager, Pennock Hart, treasurer; T. Haslan, chief engineer; Samuel McMillen, superintendent, and others were untiring in their efforts to contribute to the enjoyment of the excursion, for which all the appointments were complete. General superintendent



END VIEW OF CIRCULAR GRID INLET VALVE.

W. H. Lewis, and others of the Carnegie company were also active in contributing to the comfort and pleasure of the visitors. A buffet luncheon was served on the victorious foot ball team had just returned from the scene train both to and from Sharon. As the guests stepped from the train at the Union station in Pittsburg at 7 o'clock Saturday evening, one might have imagined that a

THOSE IN ATTENDANCE AT THE LAKE SUPERIOR MINING INSTITUTE.

of its triumph. The 400 men gave three hearty cheers for their hosts and President Fawell became the center of the enthusiam as he stood receiving the thanks and congratulations of all who had enjoyed the excursion.

The Maryland Steel Co. is building six steel barges for the Isthmian Canal Commission to be used in the construction of the canal. Each of the barges is 111 ft. 4 in. long, 24 ft. 2 in. wide and has a depth of 9 ft. They will be "knocked down" and shipped by way of New York.

THE IRON TRADE REVIEW

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NOVEMBER 2, 1905

Americans interested in the iron and steel business, visiting in Europe, will find The Iron Trade Review on sale at the office of the International News Co., Breams Buildings, Chancery Lane, London, E. C., England. Copies will be forwarded on request from London to any address in the world.

GREAT ACHIEVEMENTS ON THE LAKES.

The commerce of the great lakes has grown from such small beginnings to such amazing proportions that any discussion of it must read like romance. As an industrial theater its counterpart does not exist on earth; nor is it probable that a geographical location could be discovered covering so wide a territory in which special conditions and special obstacles have been met and conquered in so bold and original a manner. The trade of the great lakes is peculiar. It mainly consists of the transfer of three items in bulk—iron, coal and grain. So great is the volume to be moved and so brief the time in which it is possible to move it that the problem presented in handling the traffic called for the highest order of inventive genious to meet it. With what speed this evergrowing trade has been mastered is apparent from an examination of statistics. It was not until twenty years after iron ore was discovered that it began to be a factor in lake trade. In 1866 the receipts of lumber at Chicago alone were about 1,400,000 tons, while the iron ore shipments of all the lake ports were less than 300,000 tons, or to be exact, 278,796 tons. The coal tonnage was but little greater. It was 1877 before iron ore shipments had permanently passed the 1,000,000 ton mark and 1887 before they exceeded the 4,000,000 ton mark. It was 1895 before the 10,000,000 ton mark was reached and in point of fact more ore is coming down the lakes this year than came down in any two years prior to and including 1898 when 14,024,673 tons were moved. To double the tonnage in this brief space of time called for a practical revolution in types of ships and in dock equipment. Both have been magnificently met.

'Tis a mighty simple thing to sit in an office and think about these things, but the shipbuilders, shipowners and ore shippers of the great lakes had a serious problem confronting them. Ore was thundering upon the docks in a perfect torrent and great as was the dispatch in loading vessels, it was essential that it should be greater, otherwise the stream would back up and become congested at the mines and leave the furnaces to be banked for want of ore. The dock chutes were 12 ft. apart. Why not build a vessel with hatches spaced to correspond? Easy to talk about, but the classification societies gasped at it. Nevertheless, Augustus B. Wolvin had the courage to order such a ship, and the shipbuilders went at it and designed a type with hatches spaced 12 ft. centers, compensating in other directions for the reduced strength. The result was that the James H. Hoyt took on a cargo of 5,400 tons in 35 minutes and the great steamer Augustus B. Wolvin received a load of 10,250 tons in 89 minutes, being altogether 180 minutes in port. It was clear, too, that some other system than hand shoveling would have to be devised to fill the ore buckets in unloading these steamers. The necessity brought forth the inventor with the result that the automatic self-filling clamshell buckets were put on the docks. So rapid is the dispatch obtained with these buckets that over 10,000 tons have been taken out of modern steamers in a little over four hours. It is a common thing for a modern steamer carrying anywhere from 8,000 to 10,000 tons to enter port in the morning and be unloaded during the same day. Thus by great originality in design and mechanical ingenuity of the highest order have the men identified with great lakes traffic been able to cope with a commerce that has lately been expanding in a sort of geometrical ratio, or, to express it in the eloquent language of the late Gen. O. M. Poe, "of which the wildest expectations of one year seem absurdly tame by the side of the actual facts of the next."

Arthur G. McKee, who for five years past has been engaged in general engineering with the American Steel & Wire Co., at Cleveland, giving special attention to blast furnaces, has resigned and opened an engineering office at 924 Rockefeller Building, Cleveland. Before locating in Cleveland, Mr. McKee was associated with Julian Kennedy, and was in charge of blast furnace construction of the Carnegie Steel Co., at Braddock, Duquesne and Ohio works during the periods when furnaces were being constructed at those points. He has had a wide experience, and is well known as a successful engineer.

The C. B. Ford Co., Richmond, Va., has taken over the business of C. B. Ford, engineer and machinist, and will repair locomotives and manufacture locomotive stock parts and a large line of special machinery.

NEWS FROM MANY INDUSTRIES.

New Buyers :—

The Welded Steel Barrel Co., Detroit, Mich., has been incorporated with $100,000 capital stock.

The Pilling Air Engine Co., Detroit, Mich., has increased its capital stock from $20,000 to $35,000. The difference will be subscribed in cash.

The Hocking Coal & Coke Co., Columbus, has been incorporated with $10,000 capital stock by H. A. Vanauken, J. F. Treadway, J. N. Malone, C. W. Drake and Rostin Medbery.

The Millwood White Sand Co., Jackson, O., has been incorporated with $12,000 capital stock by E. B. Jones, Edwin Jones, Charles D. Jones, Fred E. Jones and J. M. M. Gilling.

The Toledo Motor Boat & Power Co., Toledo, O., has been incorporated with $10,000 capital stock by Ernest Panck, Charles R. Messenger, Harry B. Kirtlow, R. S. John and J. I. Roche.

The Fostoria Sheet Metal Co., Fostoria, O., has been incorporated with $10,000 capital stock by Mahlon M. Carr, Jacob S. Baumbauger, J. W. Sheely, F. Lindower and S. C. Shoup.

The McFadden Mfg. Co., Havana, Ill., has been incorporated to manufacture engines and machinery. The incorporators are: Bruce H. McFadden, George T. Fish and Harry H. Harvey.

The Graham-Phillips Horseshoe & Iron Co., Cincinnati, O., has been incorporated with $200,000 capital stock by Frank C. Graham, Charles G. Phillips, C. C. Hoover, H. Lee Early and Stanley Struble.

The Shagawa Iron Co., Duluth, Minn., has been incorporated to transact a general mining business. The incorporators are: William Elder, Arthur Howell and M. E. Riley. The capital stock is $50,000.

The Robert Aitchison Perforated Metal Co., Chicago, has changed its name to the Aitchison Perforating Co. The capital stock has been decreased from $50,000 to $25,000 and the number of directors decreased from five to three.

The F. Hohfelder Co., Cleveland, has been incorporated to engage in the metal business. The incorporators are: Julia Hohlfelder, A. W. Ellenberger, Alfred J. Kronke, Joseph R. Krauss and Morris Schwartz. The capital stock is $100,000.

The Munroe & Knight Machine Screw Co. has been incorporated to deal in machinery. The capital stock is $100,000. Abner T. Porter, 32 Westland avenue, Boston, is the treasurer, and Walter G. Lincoln, 30 Worcester street, Boston, is clerk.

The New York Engineering Co., Boston, Mass., has been incorporated to carry on a general foundry business with a capital of $10,000. The officers are: President and treasurer, A. F. Bremner, 25 India Wharf; clerk, G. T. Shannon, 34 School street, both of Boston.

The Insley Iron Works, Indianapolis, Ind., has been organized with a capital stock of $15,000 to manufacture structural fitting and ornamental iron. The officers are: W. H. Insley, president; Louis F. Aichhorn, superintendent and E. F. Knefler, secretary and treasurer.

The Capitol Foundry Co., Hartford, Conn., has been incorporated with an authorized capital stock of $30,000. The company will make and deal in castings of iron, steel, brass, etc., and tools and machinery. The incorporators are: Frank W. Stickle and Arthur A. Tanner, of Waterbury, and Frank H. Wilmot, of Naugatuck.

The Parker Process Co., New York, has been incorporated to manufacture hardware, motors, dynamos, etc. The capital stock is $10,000. The incorporators are: William H. Harrison, New Rochelle, N. Y.; Clifford R. Wright, 46 Manhattan avenue; Ferdinand S. Crasley, 25 Broad street, New York.

The Solamander Grate Bar Co., New York city, has been incorporated to manufacture grate bars and furnace castings with $2,500 capital stock. The incorporators are: Mary E. and George H. Clarke, 68 Quincy street, Brooklyn, and Harvey R. Mitchell, Jersey City Heights, N. J.

The Municipal Iron Works, The Bronx, N. Y., has been incorporated to construct iron work for buildings. The capital stock is $9,000. The incorporators are: Robert Feinstein, 134 East Broadway; Aaron Slacks, 153 Monroe street, both of New York; Meyer Glasser, 444 New Jersey avenue, Brooklyn.

The Penn Limestone Co., Reading, Pa., has been incorporated to quarry and sell limestone and sell and deal in lime. The capital is $15,000, and the incorporators are: E. L. Wesley, Chambersburg; C. A. Conrad, Frank J. Boyer, A. S. Boyer, H. M. Spuhler and M. G. Carl, all of Reading; J. A. Speer and Thomas W. Boyer, Bangor.

The Krause Machine Importing Co., New York, has been incorporated to manufacture machinery, engines, boilers, etc., with a capital of $10,000. The incorporators are: Hans Hinze, 8783 Bay Sixteenth street, Bath Beach; George A. Voss, 545 Seventy-sixth street, Brooklyn; Theodore C. Weygandt, 1345 Bergen street, Brooklyn.

The following companies have been incorporated under the laws of Ontario: Standard Ideal Co., Ltd., head office Port Hope, capital $500,000, to manufacture enameled ware, water pipes, machinery, etc. Provisional directors, Hiram T. Bush, Albert E. Pipher, P. L. Bush and Alice M. Pipher. Electric Meter & Stamping Co., Ltd., head office Toronto, capital $200,000. Provisional directors, Anthony Krane, Wm. Bullock, John Creighton, Fairlie Sinclair and George Kerwin. Niagara Engine Works, Ltd., head office Niagara-on-the-Lake, capital $50,000. Provisional directors, Egerton R. Lundy, Haggai, G. A. Cook, Francis G. Kick, H. M. Robinson and James Albert Keyes.

New Construction:—

J. B. Fate & Co., Plymouth, O., have a foundry building 70 x 120 ft. well under way. Most of the equipment has been secured.

The York Safe & Lock Nut Co., York, Pa., is erecting an addition 60 x 110 ft. in which it will place two furnaces for tempering steel.

The Strong & Norway Mfg. Co., Chicago, manufacturing mill machinery and supplies, is to increase its plant by the erection of a $50,000 machine shop.

The American Hoist & Derrick Co., St. Paul, is building a one-story derrick shop 40 x 185 ft., and a brass foundry and chipping room 60 x 90 ft.

The Glen Mfg. Co., St. Charles, Ill., is adding to its foundry capacity and is planning the erection in the near future of another molding room 80 x 180 ft. A 25 or 30-ton cupola will be required.

The Columbus Hocking Coal & Iron Co., it is reported, is preparing plans to build a brick plant in the Hocking Valley the coming spring. Nelsonville will probably be the location.

The Rockford Well Drill Co., Rockford, Ill., has let the contract for a foundry and pattern shop to be 100 ft. wide and 217 ft. long. Water power will be used, the plant being located in that district.

The Iron City Chain Works, McKees Rocks, Pittsburg, Pa., operated by James McKay & Co., are being extended by the addition of a shop 70 x 300 ft. A department for the manu-

facture of railroad forgings was recently added and other extensive improvements are under way which will increase the firm's output about 60 percent. The fire of Oct. 18 occasioned little delay.

The Glamorgan Pipe & Foundry Co., Lynchburg, Va., has purchased 30 acres of ground at Norfolk, where it is reported a cast iron pipe plant to cost about $500,000 will be erected.

The Norwalk Iron & Steel Co., Norwalk, O., has completed a second 20-ton Torsell open hearth furnace which will double the capacity of its plant. Agricultural implement, safe and vault steel, tool steel and forgings are manufactured.

Broderick & Quinlan have their new boiler factory almost completed at Muncie, Ind., and operations have been begun. The main structure is 200 x 320 ft. of brick, steel and tile and cost $52,000. The equipment represents an investment of nearly $100,000.

The Grays Harbor Steel Co. is to build a plant at Grays Harbor, Washington, for the manufacture of crucible steel under the new process of John Barrett, New Brighton, Pa. Considerable equipment has been purchased from the Beaver Falls works of the Crucible Steel Co.

The Massachusetts Steel Casting Co., Everett, Mass., has rebuilt one of its 15-ton open hearth furnaces which it put in operation Oct. 21, and is now using its Tropenas converter in connection with the open hearth furnace for the manufacture of both light and heavy castings.

The Tennessee Coal, Iron & Railroad Co. is soon to begin the erection at Ensley, Ala., of mills for the manufacture of about 5,000 tons of cast iron pipe a month. The mill will be located at Open Hearth Hill, just east of the company's furnaces, the plan being to use molten metal as well as cold metal in castings.

The new plant of the J. Geo. Leyner Engineering Works Co., Littleton, Colo., has just been completed after two years of construction work, and operation has been begun with 300 men employed. Five large buildings, covering about 20 acres have been erected. Machinery from the old plant at Denver has been installed and new equipment added, the plant being electrically driven.

The Jones & Laughlin Steel Co., Pittsburg, has announced the letting of the contract for the equipment of its new 26-in. structural mill on which work is being rushed. The mill will be driven by two Corliss engines which are being made by the C. & G. Cooper Co., Mt. Vernon, O. The roll train is being made by Mackintosh, Hemphill & Co. All the mill tables, hot bed, shear tables, etc., are being turned out by the Morgan Engineering Co., Alliance, O., and the cold saws and shears by the United Engineering & Foundry Co. The Fort Pitt Bridge Co. is constructing the buildings.

General Industrial Notes:—

The Model Gas Engine Works will be removed from Auburn to Peru, Ind.

The Niles furnace, Youngstown, O., recently cast 367 tons of pig iron in one day. The furnace has been averaging over 300 tons throughout the month.

The 20-in. mill of the Shelby Tool Co., Greenville, Pa., has been placed on double turns. This mill rolls steel billets for the weldless tube mills of the National Tube Co.

The Davenport Locomotive Works, Davenport, Iowa, are running night and day shifts with about 225 men employed, and are turning out 16 locomotives monthly.

E. H. Walker, foundry contractor, has retired from the Case Co., Racine, Wis., and has been succeeded by Edward Riley, for several years foundry foreman of the Milwaukee Harvester Works.

The Sweet Steel Co., Syracuse, N. Y., has chosen the following directors: John W. Maxwell, Charles H. Knapp, Harold L. Stevens, Frank M. Sears and William C. Maxwell.

The officers of the Cross Mountain Iron Co., recently incorporated to develop iron and other mineral lands in Carter and Johnston counties, Tennessee, are George K. Hamble, president; William Spaulding, secretary and treasurer; Col. Charles P. Toncray, general manager. The main offices will be at Bristol with operative headquarters at Elizabethton.

Special Agent Hutchinson in a report to the consular department, states that there is an excellent chance for the enlargement of our trade with Argentina. Our exports to that country in the last 10 years he declared have increased 100 percent against a gain for Germany of 50 and for England 26 percent. England's hold in this field, he believes, can largely be displaced.

The Standard Machinery Co., Norwalk, O., which is to remove to Bowling Green, O., has begun the construction of a factory building 50 x 150 ft., of brick, equipped with traveling crane, etc. It will be completed by Jan. 1, when the company will begin the manufacture of a line of light hoisting machinery in connection with its present output of threading tools. Associated with the company is J. C. Slocum, a consulting engineer, lately with the Jeffrey Mfg. Co., Columbus, and W. H. Wilson, inventor of the patent parts of the Standard bolt cutters and other like devices.

Col. C. P. Toncray, of Elizabethton, Tenn., has been appointed receiver of the Boston Iron & Timber Co., a Tennessee corporation organized in 1901. Col. Toncray has given bond and his receivership will be made permanent in a few days when he will convert the assets into cash and make a pro rata distribution among the outstanding obligations of the company. The assets of the corporation will aggregate about $22,000, while the liabilities are about $60,000. The company recently transferred a large part of its holdings to outside parties to pay off as much of the indebtedness as possible and attempted to tide over the temporary financial straits.

Trade Notes:—

The E. W. Bliss Co. has received a $2,000,000 order for electrical dirigible torpedoes from the United States Government.

The American Sheet & Tin Plate Co. has started mills No. 9 and 16 at Elwood, Ind., after an idleness since June 1.

The Smith Improved Lock Nut Co., Rockford, Ill., mention of whose incorporation was recently made, will run day and night shifts at their new factory. The new lock nut of which Mr. Smith is the inventor, is being used on the Chicago, Milwaukee & St. Paul railroad. A portion of the nut is a spring which takes the jar from the threads, thus preventing it from jarring loose from the bolt.

The New Process Raw Hide Co., Syracuse, N. Y., is to enter more extensively into the manufacture of metal gears of all kinds, as well as its own new process pinions. A two-story brick addition to its plant has just been completed, adding about 10,000 ft. of floor space. The company is installing a number of additional turret lathes, drills, grinders, spur gear cutters, bevel gear planers and other equipment which will increase its capacity about 75 percent. Business is reported brisk, with shipments well in excess of last year.

STANDARD SPECIFICATIONS FOR GRAY IRON CASTINGS.*

1. Unless furnace iron is specified, all gray castings are understood to be made by the cupola process.

Chemical Properties.

2. The sulphur contents to be as follows:

Light castings	not over	0.08	percent.
Medium castings	"	0.10	"
Heavy castings	"	0.12	"

Classification.

3. In dividing castings into light, medium and heavy classes, the following standards have been adopted:

Castings having any section less than ½ in. thick shall be known as *light castings.*

Castings in which no section is less than 2 in. thick shall be known as *heavy castings.*

Medium castings are those not included in the above classification.

Physical Properties.

4. *Transverse Test.* The minimum breaking strength of the "Arbitration Bar" under transverse load shall be not under:

Light castings	2,500 lb.
Medium castings	2,900 "
Heavy castings	3,300 "

In no case shall the deflection be under 0.10 of an inch.

Tensile Test. Where specified, this shall not run less than:

Light castings	18,000 lb. per sq. in.
Medium castings	21,000 " " "
Heavy castings	24,000 " " "

"Arbitration Bar."

5. The quality of the iron going into castings under specification shall be determined by means of the "Arbitration Bar." This is a bar 1¼ in. in diameter and 15 in. long. It shall be prepared as stated further on and tested transversely. The tensile test is not recommended, but in case it is called for, the bar as shown in Fig. 1, and turned up from any of the broken pieces of the transverse test shall be used. The expense of the tensile test shall fall on the purchaser.

Number of Test Bars.

6. Two sets of two bars shall be cast from each heat, one set from the first and the other set from the last iron going into the castings. Where the heat exceeds 20 tons, an additional set of two bars shall be cast for each 20 tons or fraction thereof about this amount. In case of a change of mixture during the heat, one set of two bars shall also be cast for every mixture other than the regular one. Each set of two bars is to go into a single mold. The bars shall not be

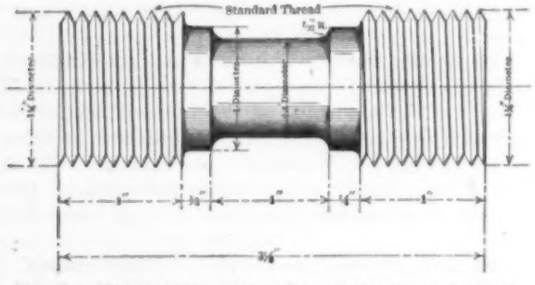


FIG. 1.—ARBITRATION TEST BAR. TENSILE TEST PIECE.

rumbled or otherwise treated, being simply brushed off before testing.

Method of Testing

7. The transverse test shall be made on all the bars cast, with supports 12 in. apart, load applied at the middle, and the deflection at rupture noted. One bar of every two of each set made must fulfill the requirements to permit acceptance of the castings represented.

Mold for Test Bar.

8. The mold for the bars is shown in Fig. 2. The bottom of the bar is 1-16 of an inch smaller in diameter than the top, to allow for draft and for the strain of pouring. The pattern shall not be rapped before withdrawing. The flask is to be rammed up with green molding sand, a little damper than usual, well mixed and put through a No. 8 sieve, with a mixture of 1 to 12 bituminous facing. The mold shall be rammed evenly and fairly hard, thoroughly dried and not cast until it is cold. The test bar shall not be removed from the mold until cold enough to be handled.

Speed of Testing.

9. The rate of application of the load shall be from 20 to 40 seconds for a deflection of 0.10 in.

Samples for Analysis.

10. Borings from the broken pieces of the "Arbitration Bar" shall be used for the sulphur determinations. One determination for each mold made shall be required. In case of

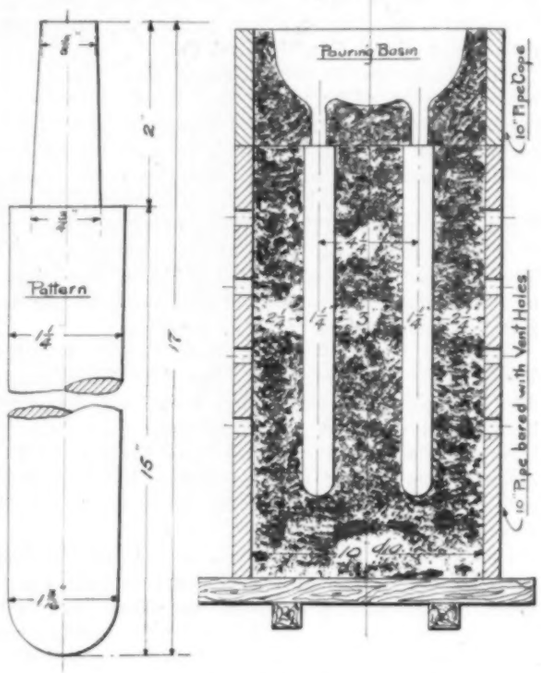


FIG. 2.—MOLD FOR ARBITRATION TEST BAR.

dispute, the standards of the American Foundrymen's Association shall be used for comparison.

Finish.

11. Castings shall be true to pattern, free from cracks, flaws and excessive shrinkage. In other respects they shall conform to whatever points may be specially agreed upon.

Inspection.

12. The inspector shall have reasonable facilities afforded him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall, as far as possible, be made at the place of manufacture prior to shipment.

* As adopted by the American Society for Testing Materials.

Edward, Brown, well known as an inventor and manufacturer of scientific instruments, died Oct. 22 at his home in Philadelphia, after a brief attack of pneumonia. He was born in England, coming to this country to establish in 1860 the business now conducted under the name of Edward Brown & Son. Richard P. Brown, junior member of the firm, will continue the business, employing the patents of the deceased.

CHASE OSBORNE'S RICH FIND.

Becomes a Wealthy Man by Investing In Sudbury Ore Mine.

(Special Correspondence.)

Sault Ste Marie, Mich., Oct. 31.—Chase S. Osborne, of this city, has just sold his interest in a mining region north of Georgian Bay at a figure which will make him a wealthy man. Mr. Osborne is the proprietor of the Chippewa County News, of this place. Some three years ago a prospector whom he had known came to his office here and reported the discovery of a great iron ore vein north of Sudbury, on the Canadian Pacific road. Mr. Osborne was given an option for $10,000. He interested Capt. Jos. Sellwood, a well-known mine operator of the Lake Superior region, and after an examination of the properties they were purchased by Mr. Sellwood and John W. Gates, Chicago; John J. Mitchell, president of the Illinois Trust and Savings bank; John Lambert, of Chicago; Chas. G. Gates, of the brokerage firm of Harris, Gates & Co., New York; C. Hutchins, attorney for the Illinois Trust & Savings Bank: and John C. Spry, of the lumber firm of the same name, Chicago. Messrs. Osborne and Spry have now closed their interest, and Mr. Hutchins is about to sell his. The buyers are the Canadian firm of Mackenzie & Mann, well known from their connection with railway building on the north side of the international line. It was this railway building that brought them into connection with the property on Moose mountain, for they are now arranging to build from Ottawa to the north side of Lake Superior, and the line as its surveys run is but a little way from these properties. The price paid Messrs. Osborne and associates is said to be about $750,000, and is for something like a third of the stock.

Two Furnace Accidents.

Two Ohio furnaces were the scenes last week of serious explosions. At the plant of the Struthers Iron Co., Struthers, O., Oct. 24 a large ladle, which was carrying the molten iron from the stack up an incline to the casting house, became uncontrollable and turned over, throwing its load into a pool of water beneath. The explosion which resulted wrecked the casting apparatus and caused considerable damage to other parts of the plant. A negro employee who was struck by a falling pipe was killed, but other employees escaped serious injury. The accident will necessitate the idleness of the furnace for several weeks.

A slip in the stack of the Marting Iron & Steel Co.'s furnace at Ironton, O., Oct. 25, caused an explosion which threw the bell and the hopper on the top of the furnace along with a large quantity of ore, coke and limestone and bent the rigging on the top of the furnace in such a manner that it was necessary to take it down for straightening. Several workmen were slightly injured by falling coke and ore. Every effort is being put forth to repair the damage and the blast will be resumed within a few days.

Blast Furnaces Resume.—The Empire Steel & Iron Co. has started its furnaces at Topton, Pa., after five months' idleness for repairs, and the Bass Foundry & Machine Co. has its stack at Rock Run, Ala., in blast again after overhauling the plant. The Zanesville furnace of the Carnegie Steel Co. is to blow in about Nov. 15 and repair work on the Sheridan furnace at Sheridan, Lebanon County, Pa., is being rushed.

Mrs. Sarah A. Mass, mother of Thomas D. West, died Oct. 26 at her home in Cleveland, O.

PERSONAL.

Henry C. Frick has leased a house at 640 Fifth avenue, N. Y., where he has taken up his residence.

Delmer W. Call has left the National Malleable Castings Co. to accept the fourth vice presidency of the American Steel Foundries.

Alexander Henderson has been succeeded by Harry H. Hornsby as sales manager of the conduit department of the Sprague Electric Co., New York.

Orlando Miller, purchasing agent of the Westinghouse Air Brake Co., Pittsburg, will spend the winter in California on a six months' leave of absence.

James O'Donnell has been appointed general labor foreman for the five furnaces of the Carrie group of the Carnegie Steel Co. at Pittsburg. He succeeds J. David Cubbage.

Albert J. Pitkin, president of the American Locomotive Co., has been advised by his physician to discontinue business activities until his health has been recuperated.

Roy Richards has been appointed traveling auditor for the Colorado Fuel & Iron Co., filling the position which was abandoned some time ago when W. E. Maltby resigned.

Business associates of Archibald Stewart, chief accountant of the Bullock Electric Co., Cincinnati, O., recently tendered him a farewell banquet and theatre party as he has been transferred to the Allis-Chalmers Co., Milwaukee.

Dr. M. E. Rothberg has associated himself with the Coke Oven Construction Co., Cleveland. He was manager of the Coke Oven plant of the Cambria Steel Co., Johnstown, Pa., and of the Lackawanna Steel Co., Lebanon, Pa., and Buffalo, N. Y. He rebuilt the ovens of the Retort Coke Oven Co., Cleveland. The Coke Oven Construction Co. is building by-product coke oven plants under Dr. Rothberg's patents.

C. H. McCullough, Jr., has been elected a vice president and the general manager of the Lackawanna Steel Co., with headquarters for the present at the works at Buffalo, N. Y. He came to the company shortly after President Clark became its head.

STEEL CORPORATION'S HEAVY BUSINESS.

The largest amount of business on record is shown by the report of the United States Steel Corporation for the third quarter of 1905, made public this week. The volume of unfilled orders is given as 5,865,377 tons, an increase of about 1,000,000 tons as compared with July 1, and almost 300,000 tons more than last March when the high record was set. The net earnings for the quarter, $31,240,582, were about what had been predicted, and exceeded the earnings of the third quarter of 1904 by $12,466,650. The surplus for the quarter was $10,672,613. The regular quarterly dividend of 1¾ per cent on the preferred stock was declared, payable Nov. 30.

Colorado Steel & Iron Co. Report.

The report of the Colorado Fuel & Iron Co., which has just been made public, shows a deficit for the year June 30 after the payment of interest, taxes, and rentals of $34,993. The dificit for the previous year was $41,584,857. Earnings for the year were $418,615,017, an increase of $49,989,341, against operating expenses of $416,884,198, an increase of $8,477,517.

Joseph C. Brown, aged 65, superintendent of the Sterling Steel Foundry at Braddock, Pa., died Oct. 25 after a brief illness. He was for a time in charge of the Coxey steel plant, Mt. Vernon, O.

BRITISH PRICES ADVANCE.

Pig Iron Market Excited—Ship Building Orders Are Heavy.

(Special Correspondence.)

BIRMINGHAM, ENG., OCT. 24.—The quarterly iron trade meeting in Birmingham on Oct. 12, surpassed expectations. The attendance was the biggest for many years past. For the accommodation of business men from South Wales, who attended mainly to deal in steel and tin plates, a special train was found necessary. The ports were represented to a most unusual extent, and everybody had good orders to place. Some very large lines were given out for Canada, South America and the Cape. In respect of pig iron the market was unusually excited. Most of the furnaces are so well booked forward that many decline to quote. For certain brands of part-mine the quotation jumped from £2 10s 0d the previous week, to £2 17s 6d and some Derbyshire makes were quoted at £2 16s 0d.

For most descriptions advances of 2s 6d on the week were realized. The most important event of the day was a meeting, under the presidency of Sir George Hingley, Bart., of the barmakers, who raised the price of bars from £6 5s 0d to £6 10s 0d, and appointed a committee to consider the possibility of some pooling arrangement and a general tightening up of the strings of the association. It is likely that the suspended Unmarked Bar Association will be revived on a wider and more thoroughly effective basis.

At a meeting of the galvanized sheet makers, presided over by Mr. J. P. Lacy (Messrs. Ash & Lacy, Birmingham) record shipments were reported and prices are expected to be put up this week from £11 5s 0d to £11 15s 0d. Other advances were 5s 0d in black sheets and hoops, and 10s 0d in Scotch steel, and cold blast makers have just withdrawn a discount of 5s 0d, which raises the selling figure from £4 17s 6d to £5 2s 6d.

Prepared for Good Times.

The large works with sufficient foresight to prepare for the good times coming are now congratulating themselves. Among these the Patent Shaft & Axletree Co. (Wednesbury) has shown special smartness in doubling the size of its Old Park works so as to construct the bogy portion of railway carriages and wagons instead of merely the wheels and axles. This firm, which a few years ago had a great struggle to keep its head above water, is now under the chairmanship of Mr. J. P. Lacy in a splendidly flourishing condition.

Mr. Ebenezer Cooper, one of the best known of Black Country ironmasters, attained his 75th birthday on the 16th inst., and on the 18th inst. was presented with an illuminated address signed by representatives of several political, social and religious bodies at Brierley Hill. Almost curious circumstance is that before commencing business Mr. Cooper worked as a furnaceman at three of the four establishments now owned by his firm.

Several big shipbuilding orders have been given out on the Clyde within the past few days. The London and Glasgow company has booked a twin-screw steamer for Messrs. H. E. Moss & Co. and Messrs. Stephen, of Limehouse, have received orders for several boats. Messrs. Barclay, Curle & Co. are building a couple of steamers for English owners, while the Oilsa Shipbuilding Co. has undertaken five small boats for the South African trade.

The sudden death is announced of Sir E. H. Carbutt, of the firm of Thwaites & Carbutt, Leeds, the well-known builder of steam hammers. He took part in the recent meeting of the institute at Sheffield, but was then suffering from the effects of a recent operation, which eventually resulted in his death.

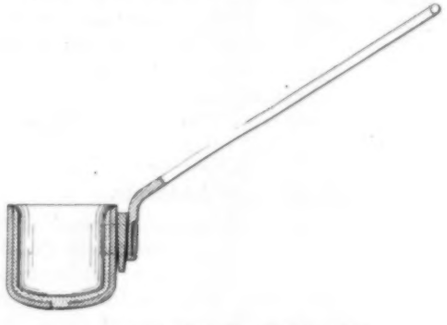
Building is Extensive.

Numerous new works and extensions are being built. A new steel foundry is about to be erected for the Coltness Iron Co., Ltd, Newmains, by the Dalziel Bridge & Roof Co., Motherwell. The Barrow Steel Works, which have been partly idle owing to an insufficient supply of metal, are now running full time, and Messrs. Dorman, Long & Co., of Middlesboro, who have been idle several months, owing to a dispute affecting nearly 1,200 men, have just resumed operations. The Ebbe Vale Co. has just installed what is said to be the largest metal mixer of its kind ever constructed. It is capable of dealing with 750 tons of metal at a time.

Birmingham, as the great home of the gun industry, uses a large number of barrels, but for some time the quality of iron barrels has been unsatisfactory. The Birmingham Small Arms Co., Ltd., has practically solved the problem by a new departure turning out a steel barrel made of Siemens-Martin steel, which gives the greatest satisfaction, being much more reliable and more uniform than iron can possibly be.

A Handy Foundry Ladle.

Mr. McDermid, of Chicago, Ill., has recently invented and patented a very handy foundry ladle. Instead of providing each hand ladle with a fixed handle riveted to the shell, he provides a small loop on the face of each shell, as shown



A HANDY FOUNDRY LADLE.

in the accompanying figure. The end of the ladle handle is flattened down and notched as shown. The handle is then slipped through the loop and drawn back against its inner face. An iron wedge is dropped between the ladle and the handle, thus fastening it securely. With this device the ladles can be handled much more conveniently when cleaning, lining, heating, etc., and a much smaller number of ladle handles will be required than when the old style is used.

A New Type of Sleeping Car.

The American Palace Car Co., New York, had on exhibition in Cleveland on Oct. 24 the sleeping car Columbia, which possesses a number of points of radical difference from the ordinary type of car. The car is fitted up with wicker chairs in the day time, being similar to the usual parlor car. Berths and bedding are carried in steel lockers underneath the car, from which they are raised already made up when desired. The berths have a space on each side of them and the upper berth is provided with window space. A system of ventilation is provided which affords a full circulation of fresh air throughout the car. By the carrying of the berths and their fixtures below the floor of the car the center of gravity is brought low causing the car to ride very easily.

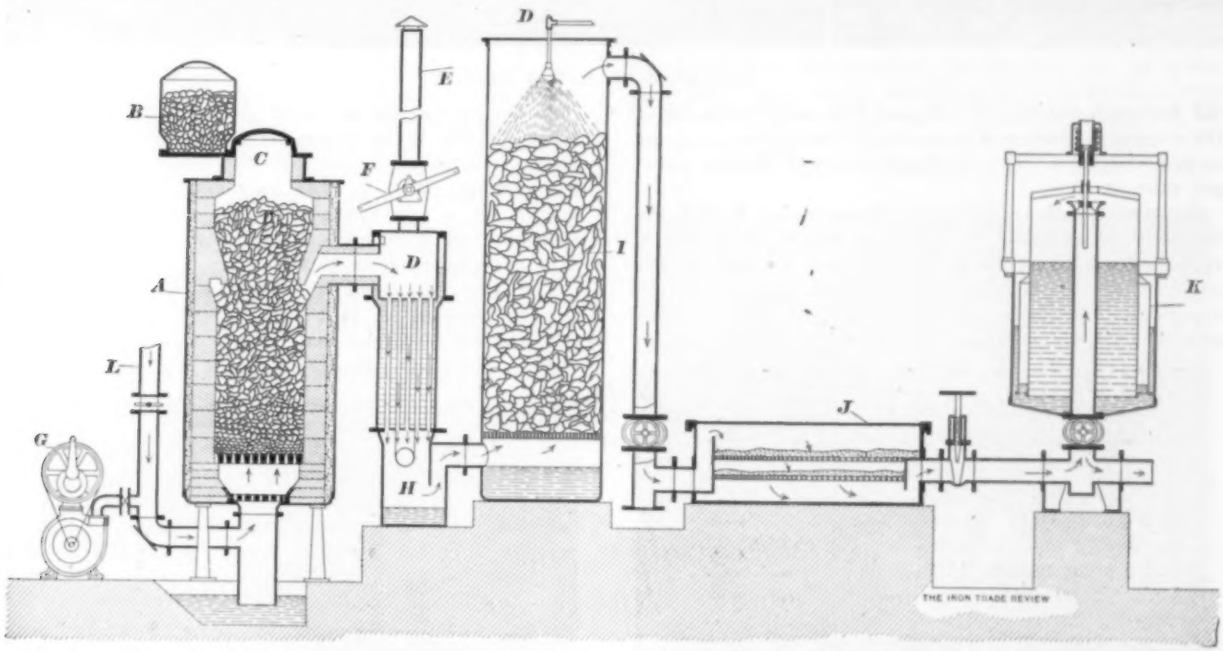
A system of ventilation is provided in the lockers below the car which contain the berths and bedding, which thoroughly airs these fixtures during the day time.

PLANTS OF THE OLDS GASOLINE ENGINE WORKS AND THE AMERICAN SUCTION GAS PRODUCER CO., LANSING, MICH.

(BY AN EDITORIAL REPRESENTATIVE OF THE IRON TRADE REVIEW.)

The plants of the Olds Gasoline Engine Works and the American Suction Gas Producer Co., together with that of the Olds Motor Co., are all located on one tract of land in Lansing, Mich. The Olds Gasoline Engine Works were originally organized to manufacture larger sizes of gasoline engines similar to those used in the Olds runabouts. Gradually the line of engines manufactured was increased until to-day all sizes from one and two horsepower up to several hundred horsepower are made, both for gas and gasoline. The natural outgrowth of the gas engines was the use of producer gas in connection with them, and to meet this demand the American Suction Gas Producer Co. was formed to operate under the American rights for the Pintsch patents. The products manufactured by these two companies will be described first, and then the plant for their manufacture.

Two styles of engines are made. For general power purposes an engine governed on the hit and miss plan is furnished especially for use in connection with agricultural work, and these engines have found a very extensive field for pumping, grinding corn, chopping feed and serving other power purposes about farms. The larger sizes are used quite extensively as motive power in shops. These are made to operate both with gas and gasoline. For power purposes in connection with electric light plants and other situations where close regulation of speed is required, a line of engines provided with throttling governors is manufactured. Most of the larger sized engines belong to this class. One of the large throttling engines is shown in one of the accompanying illustrations erected on a temporary foundation in the shop. They are extensively used in connection with suction gas producer plants.



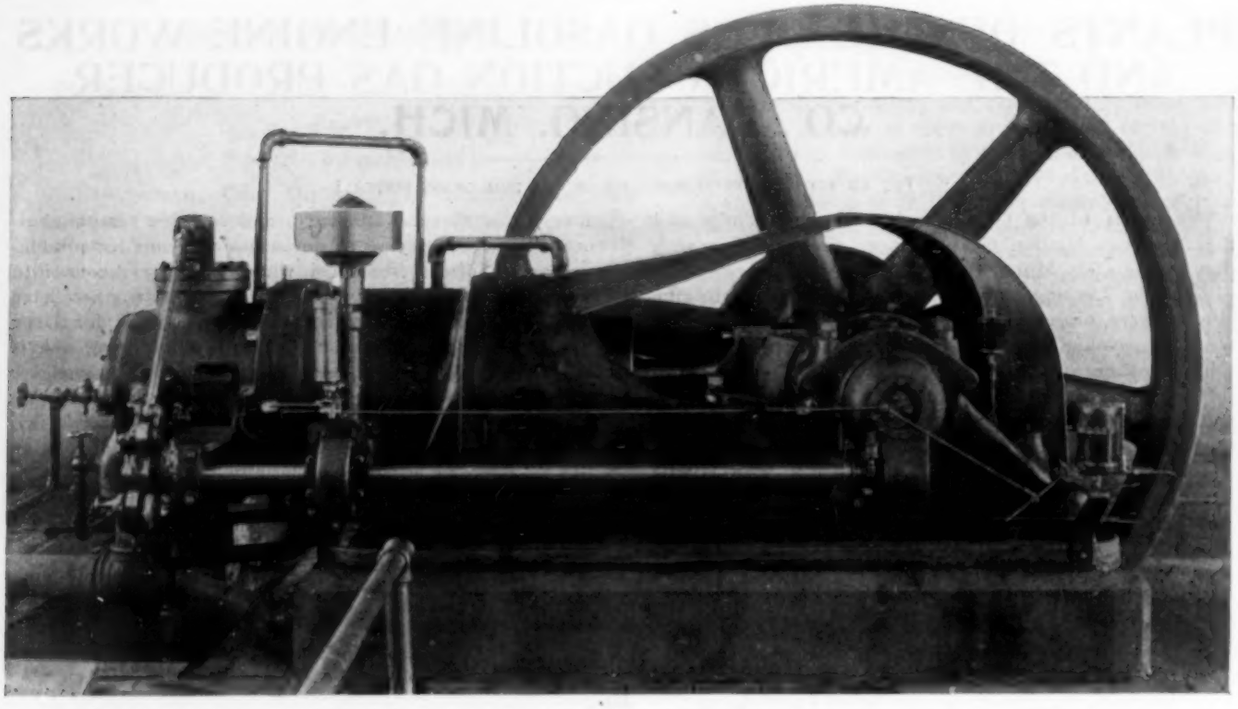
SECTIONAL VIEW OF AMERICAN SUCTION PRODUCER.

Gas Producers.

Even the best possible steam installations operate at a very low thermal efficiency, and for this reason engineers have been trying to devise some means for producing power direct from fuel without having recourse to the steam boiler. The gas and gasoline engines have come into extensive use for this purpose, but for large installations, gasoline or high grade illuminating gas is expensive and, hence, many attempts have been made to develop a suitable gas producer for small or medium size installations. Producer gas makes an almost ideal fuel for power purposes, but to obtain the best results an engine must be designed especially to use this class of gas, as one designed for operation with natural gas or the richer illuminating gases is not generally well fitted for use with producer gas.

Illuminating gas is generally made from bituminous coal, but an extensive plant is required to remove the tar and clean the gas. This plant always takes considerable attention and the by-products have to be disposed of if the plant is to be operated economically. In the case of very small plants the use of this auxiliary apparatus entails a large first expenditure for plant and a constant expenditure for maintenance. On this account for small installations anthracite coal is generally used in the producer. However, any other fuel which does not produce tar, such as coke or charcoal, can also be used.

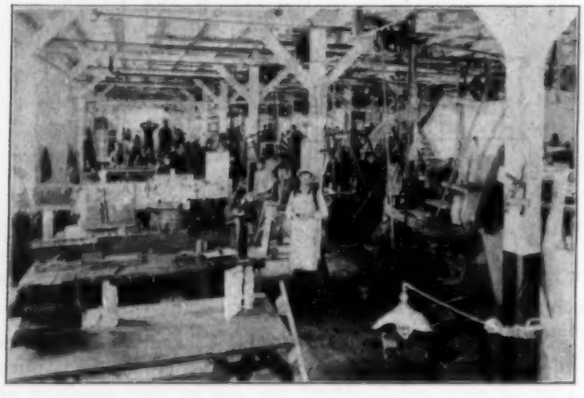
The theory of forming producer gas is very simple. If a fire be maintained and supplied with a large amount of oxygen all the solid fuel will be burned to carbon-dioxide gas CO_2, which is simply a product of combustion and cannot be burned. If, however, the fire be supplied with a limited amount of oxygen, the fuel will be burned to carbon-monoxide CO, and this can subsequently be burned to carbon-dioxide. It has also been found that if a certain amount of steam be blown through the fire it will be decomposed into oxygen and hydrogen,



GAS ENGINE ON TESTING BLOCK.

the hydrogen mixing with the gas and enriching it, while the oxygen combines with some of the carbon to form carbon-monoxide. This is simply the well known water gas process.

To carry on these processes, however, has baffled the ingenuity of engineers for a great many years, and it seems almost paradoxical that the final solution of the problem should be accomplished with such a simple apparatus. The most successful producer of this class was developed by Julius Pintsch, of Berlin, Germany,



INTERIOR OF PATTERN SHOP, OLDS ENGINE CO.

and put on the market in 1900. In this apparatus the suction of the engine supplies the draft necessary for maintaining the fire. Other gas producers working on the pressure principle have been on the market for some time and are very successful, but there are several practical objections to them.

In the first place, the pressure equipment requires the continual operation of a blower, either power or steam, and this absorbs considerable power. In the second place, as there is a constant pressure on all parts of a pressure apparatus, there is a tendency for gas to escape outward into the room where it might be ignited and cause serious explosions.

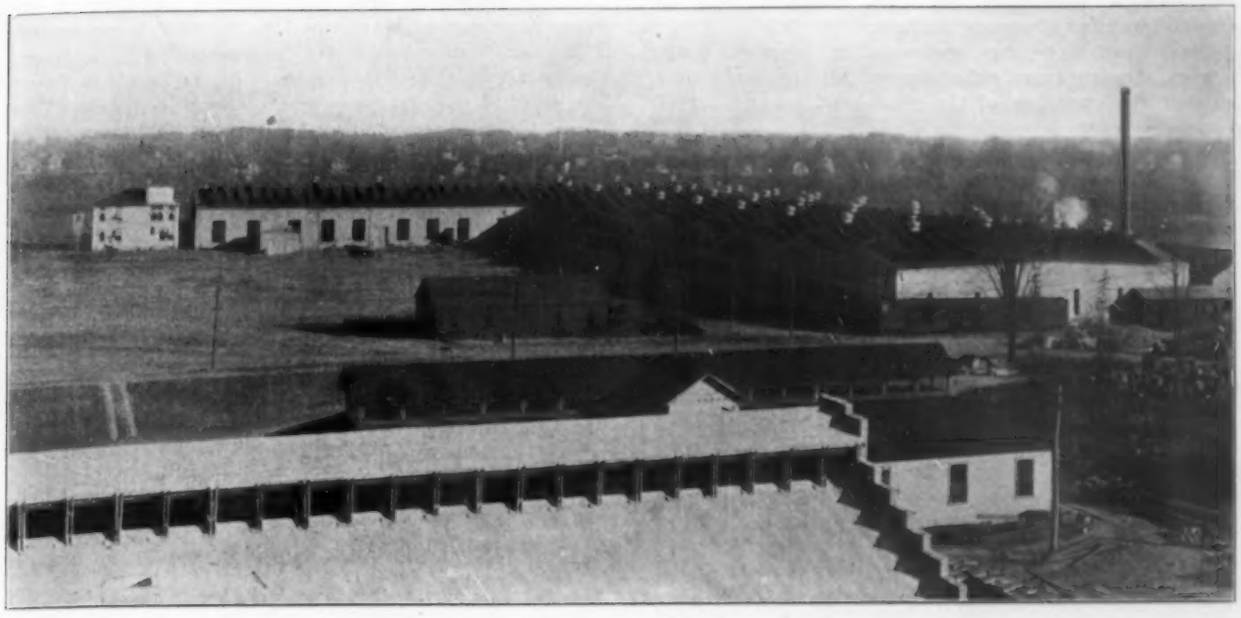
In the suction gas producer all parts of the apparatus are constantly below atmospheric pressure, so that if any leaks occurred, air would enter the apparatus in place of gas escaping from it. The only exception to this rule occurs for a few moments at the time the engine is stopped, and with proper regulation no difficulties are ever experienced from this source.

The apparatus itself is shown in one of the accompanying figures. A is the producer proper, which in construction resembles very closely a large base burner stove. There is a magazine at the top which may be

PATTERN STORAGE, OLDS ENGINE CO.

filled by swinging the hopper B over the opening C, and allowing the coal to fall in by withdrawing the slide. In this way coal can be introduced without interfering with the operation of the apparatus. The producer is lined with fire brick, and is provided with a grate at the bottom.

In starting with a cold plant a fire is built on the grate and the products of combustion allowed to escape into the chamber D and up through the chimney E, the opening to the chimney being controlled by the valve F. As the fire burns up, more coal is added and a forced blast maintained by means of the blower G. After the fire is well started the valve F is closed and the gas



EXTERIOR OF PLANT.

forced down through the small tubular boiler shown below the chamber D. The gas then passes through the chamber H, which is provided with a water seal that under ordinary circumstances closes the opening leading to the scrubber I. The scrubber consists of an iron cylinder, which is filled with broken coke, over the top of which water is sprayed and allowed to trickle through. This water absorbs the heat from the gas and also removes any tarry products. From the scrubber the gas passes to the cleaner J. This consists of a cylindrical vessel having a number of horizontal shelves covered with grating upon which are placed layers of wet shavings or some similar material.

From the cleaner the gas passes directly to the engine, except for the fact that the governor K is arranged on the gas pipe and acts like the air cylinder on a steam pump to maintain a constant pressure. During the suction stroke of the engine, part of the gas is drawn directly from the producer through the scrubber and cleaner, and part of it is drawn from the governor. During the balance of the stroke of the engine, the governor chamber is taking the gas produced, so that there is a constant flow from the producer. The governor is one of Mr. Pintsch's patents and is really one of the most important parts of the apparatus.

When the apparatus is first started, a small test cock is opened near the engine, and is kept open until the gas will burn from it with a clear strong stream five or six inches long. During this time the blower G is kept slowly in operation and the valve F has been closed. The engine is then started, after which the blower G may be stopped and the producer allowed to draw its supply of air from outdoors through the pipe L, the suction of the engine serving to produce the necessary draft.

The heated gases, as they escape into the chamber D, have to descend through the vertical boiler shown, and thus generate a certain amount of steam. This steam is introduced into the ash pit and has several beneficial effects. First, it gives up hydrogen, which adds to the actual power of the gas; second, it furnishes oxygen to the fire, which combines carbon to form carbon-monoxide; third, the presence of moisture in the fire prevents the formation of large clinkers; fourth, the moisture keeps the grate cool and prevents the burning out of grate bars; fifth, much of the heat escaping from the producer is utilized in forming the steam and is thus returned to the producer, which is a conservation of energy.

The average analysis of producer gas obtained from a

BABBITING ENGINE FRAMES.

good grade of anthracite coal will have the following composition by volume:

Carbon-dioxide CO_2	6 percent.
Carbon-monoxide CO	24 percent.
Hydrogen H	15 percent.
Nitrogen N	55 percent.
Oxygen O	a trace.
Marsh-gas CH_4	a trace

With the use of such an installation as this it is possible to develop a horsepower with the expenditure of a little over one pound of anthracite per hour. With Welsh

anthracite a horsepower has been produced with the expenditure of 15½ ounces per hour.

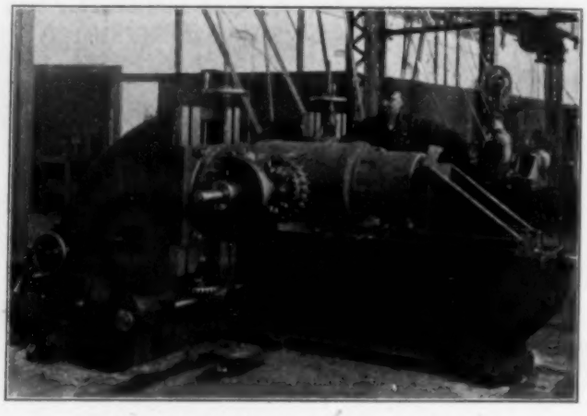
Every part of the apparatus is provided with gauges, showing exactly the vacuum existing at any time, so that the condition of the plant can be noted at all times.

When the engine is stopped at night the fire is simply banked, the ash pit and draft openings being closed and the chimney E left open. In the morning the blower is started a few minutes to blow up the fire before gas is started through the cleaning apparatus.

BABBITING CRANK SHAFT.

Owing to the fact that the apparatus is always under a slight suction, the fire door can be opened at any time for raking the grates or removal of ashes. In actual running there is a small amount of dust and dirt carried over through the chamber D and deposited in the chamber H, and this is removed periodically. The apparatus takes up but a very small amount of space and can be tended to without much work. The writer, who had been used to seeing a man shovel large quantities of coal to run even a 60 h. p. engine, was rather surprised to see a gas producer of that size charged with coal buckets very much as an ordinary domestic heating stove would be, and this certainly shows the efficiency more graphically than almost any other fact witnessed on the visit to the plant.

The factory is equipped with a very fine laboratory for the testing of coal, and whenever an order is received, a sample of the coal to be used is requested. This is analyzed, tested and an apparatus designed especially to meet the requirements, for it has been found in practice that each equipment should be designed to meet the exact requirements of the local situation. This



MILLING BOSSES ON ENGINE CYLINDER.

does not mean that the apparatus is trappy or difficult to handle once it is installed, but simply means that to achieve the greatest success and the highest efficiency from the fuel employed, the plant must be designed to suit that fuel.

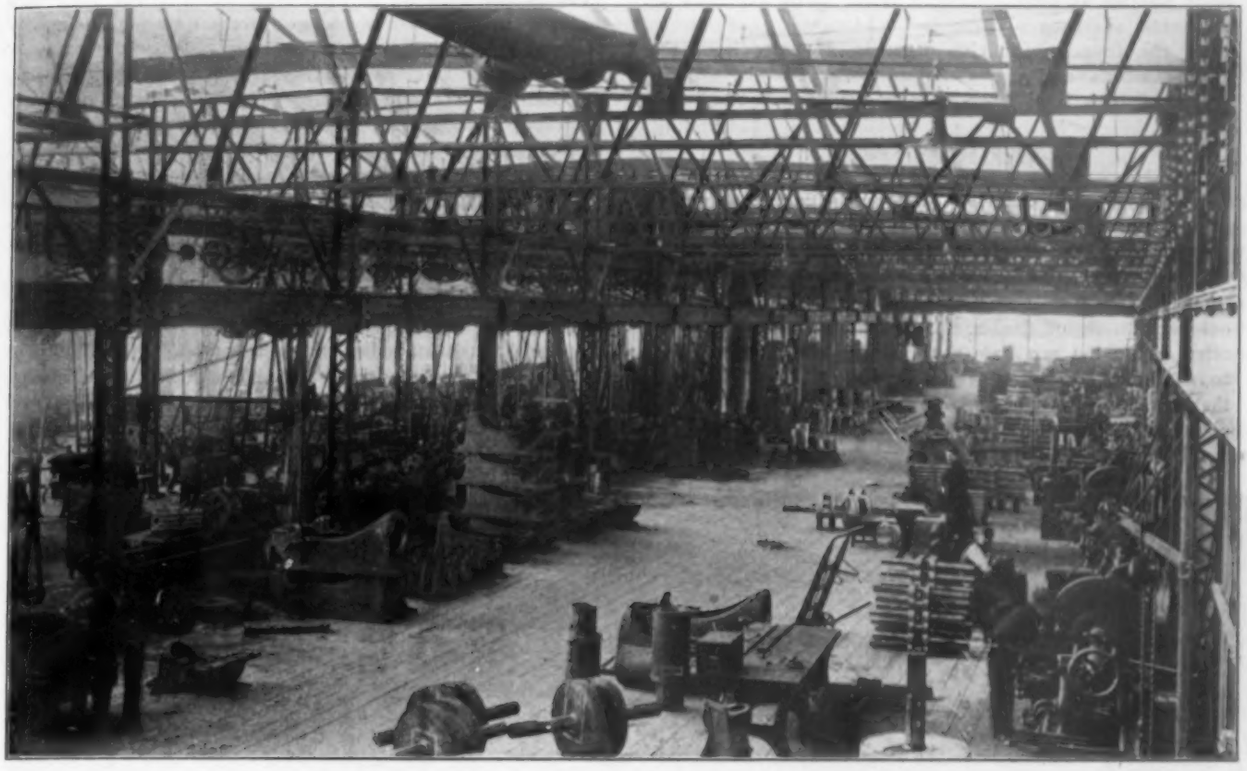
Pattern Department.

The pattern shop is situated in a building 150 ft. x 42 ft. located between the plants of the engine company and the Olds motor works. The shop is equipped with a full line of modern patternmaking machinery and the necessary benches for the patternmakers. The building is constructed long and narrow, so as to give ample light from the side windows and the benches are placed in such a manner that each man faces the light.

The pattern storage is situated in a two-story building 85 ft. x 71 ft., located between the pattern shop and the foundry. This building is certainly of unique construction, and is as near fireproof as it is possible to make a building for this purpose. In one corner of the building are two rooms, one on each floor, which serve as an office

LAVATORY.

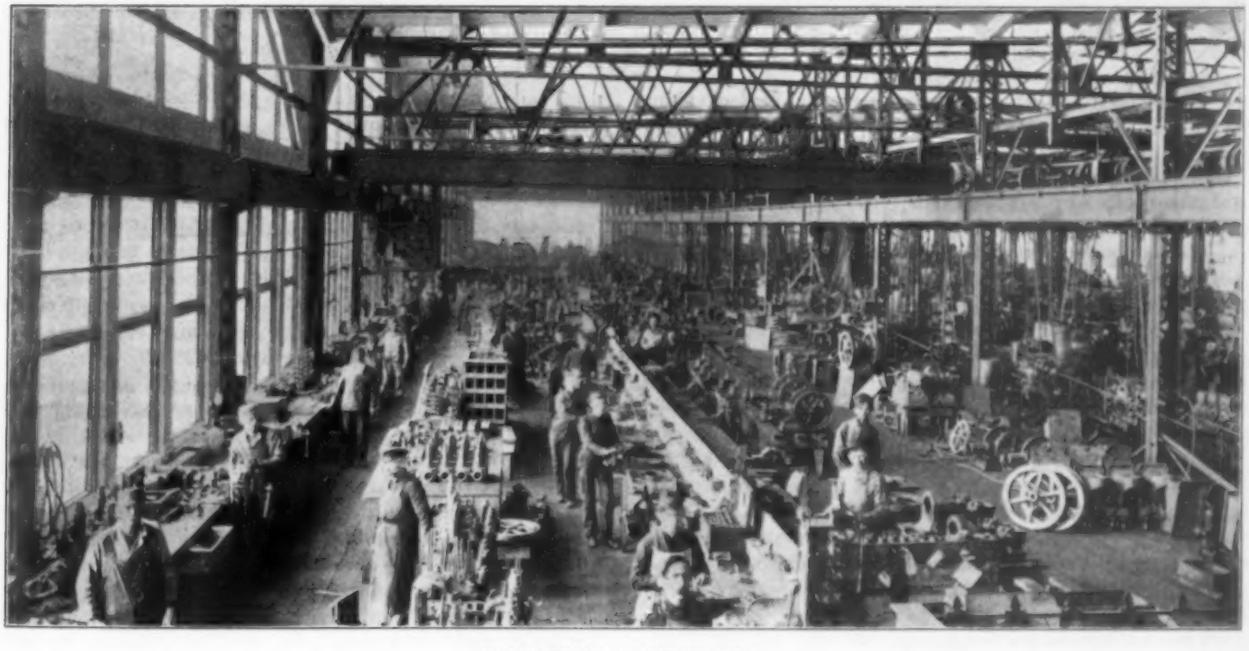
for the man in charge of the pattern storage, and also for the sorting, inspecting and arranging of patterns, core boxes, etc., before they are sent to the foundry, or as they are received from the foundry on their way to the storage. An elevator is provided for taking patterns from one floor to the other, and these rooms are lighted by



MAIN BAY OF MACHINE SHOP.

windows in side walls. The remainder of the space on each floor is taken up by fireproof vaults, having no windows whatever. Each vault is closed by a fireproof door, and the doors are provided with self-closing attachments which can be released by the melting of fusible plugs in the case of a fire in any of the rooms.

The vaults are lighted by electric lights, the wires for which are placed in armored conduits arranged along the fireproof ceilings over the aisles, so there is no danger from fire by wires coming in contact with the woodwork. The vaults are heated by steam coils placed against the side walls, and during the winter the temperature is always kept above the freezing point. This arrangement certainly makes a very efficient way of protecting wooden patterns. In the vaults described the wooden patterns are kept on shelving. If such vaults were used for keeping a



SMALL ENGINE ERECTING SHOP.

large number of metal patterns, it might be advisable to use metal shelving.

As the foundry for this plant is used by both the engine works and the Olds motor works, it will be described in a later issue in connection with the latter plant.

Shop Construction.

The shop construction and the general arrangement of the plant of the gasoline engine company's works is unique, and is shown very clearly in the accompanying illustrations. The works consist at present of nine parallel spans or bays running across the property. Eight of these are of the same length, while the ninth has been extended to about double the length of the others. The office is situated in a frame building at the end of the long bay. The object in making a frame office building was that in the future it can be easily moved forward and the plant extended. In this way the plant can be extended to about ten times its present capacity without discommoding the work or interfering with the present plant in any way. The separate buildings or bays run north and south, and light is provided by large windows in each end, and a series of sawtooth skylights, following the slant of the roof. For ventilation a series of star ventilators are placed upon the gables at equal intervals.

The crane runways are at right angles to the bays; in other words, the roof structure is independent of the shop layout.

The shop is so arranged that the castings and other supplies are received from a railroad track, or from the foundry at the right hand end of the plant, as shown in the general exterior view. The parts then proceed through in regular order, until the finished engines are loaded and shipped from the shipping room, which is next to the office.

Machine Shop.

Traveling cranes are arranged in two bays, and a third bay is devoted to light machines, while the fourth bay is devoted to the assembling of the small engines. The engines are erected under the traveling cranes and these cranes have runways extending into the testing room, which runs across the end of the machine shop. An engine can thus be brought from the erecting floor and placed in the testing room, where it is picked up by another crane and set on the testing block.

The larger machine tools are placed under the traveling cranes and are either motor driven or driven by short lines of shafting, motors being used in accordance with the regular group plan. All of the small machines are also arranged in groups, the shafting for each group being driven by a motor. In the machine shop are many special machines and devices worthy of mention. In one of the illustrations is shown a large double headed milling machine with inserted cutters used for facing castings.

For babbitting the engine bearings a special jig is used which locates an arbor at right angles to the cylinder bore. This is accomplished by clamping a flange against the end of the frame where the cylinder is subsequently to be bolted. This brings the babbitting mandrels centrally in the bearings.

TESTING DEPARTMENT.

The counter-balance weights for the cranks on the small sizes of engines are also secured by babbitting in place. The cranks are first rough turned and the discs are finished approximately to size. A special double chuck has been arranged, one set of jaws centering the disc and the other the crank shaft. After the two parts are thus located in their proper relationship to each other, the space between them is filled with babbitt. The crank, with the discs, is subsequently returned to the machine shop and finished.

Testing Department.

When an engine is completed, it is taken to the testing department by one of the traveling cranes running over the erecting departments. The traveling crane in the testing department then sets the engine on the testing block and the necessary connections are made. The engines are first set on one side of the room, belted up to a jack shaft and run for several hours to limber up all the parts. One or two engines are always kept on this side of the floor connected up with the gas and used for driving the jack shaft. With the exception of one or two engines used for driving a line shaft all engines are then transferred to the other side of the room and connected

with the gas or gasoline, an exhaust pipe run out through a hole in the wall and the engine started. As soon as the engine runs freely, it is belted to a generator and made to run under load for several hours.

Each generator is connected to a small switchboard, and the mains from this switchboard are carried to a common switchboard from which the current is distributed for use throughout the shop. In this way the testing block is made to furnish all of the power required for running the plant, and this item alone is found to effect a saving of several thousand dollars per year.

Finishing Department.

After an engine has been tested it is lifted by a traveling crane and carried to the finishing department, where it is cleaned, mounted upon a special truck, painted and then the truck is run into the drying room. These trucks are transferred from one track to another by means of a transfer table, and to a series of dry kilns arranged along one side of the room in which the paint can be baked on.

ERECTING SHOP OF THE AMERICAN SUCTION GAS PRODUCER CO.

After the engines come from the dry kiln they are skidded or crated for shipment.

Toilet Rooms.

At one side of the machine shop there is a wing containing the toilet and lunch rooms. Each workman has an individual expanded metal locker, and individual wash basins with hot and cold water are provided. The toilet rooms proper are situated at one end of the locker room, and in the center of the locker there is a long table where the men may eat their lunch.

Plant of the American Suction Gas Producer Co.

The building of the gas producer company is smaller than the shops of the engine company, but is equipped in the same complete manner with cranes, pneumatic tools, etc. While the sheet metal work, machine work, etc., on the gas producers is practically all done in the machine shops of the engine company, several machines have been erected in this building which facilitate the work and permit special jobs to be done without delay. However, the suction gas producer work is more nearly in the line of consulting engineering work, as the figuring and arranging of each plant takes up quite a large amount of time. After the layout has been finally decided upon, it is a comparatively small matter to assemble the standard units which compose a plant, but each plant presents special problems of its own, and must be handled by itself. This is especially true of the piping.

GOVERNMENTAL "RED TAPE."

Case of Toledo Firm Shows Troubles Experienced by Contractors

(Special Correspondence.)

WASHINGTON, Oct. 31.—The amount of "red tape" to which manufacturers, contractors and other firms in the trade may be called upon to submit with what grace they may in their dealings with the United States Government is well illustrated by the difficulties encountered by the dredging firm of Breyman Bros., of Toledo, O., in securing from the war department a claim of $65,000, which has been held up because of a peculiar chain of circumstance.

The sum above mentioned is due Breyman Bros. on account of dredging work near the port of Boston under contract with the United States Government. Upon the completion of the work the United States Government engineer in Boston, Col. W. S. Stanton, mailed the firm at Toledo his check on the Boston sub-treasury for $65,000, the sum called for by the contract. However, the railroad train bearing the check was wrecked and that portion of the check which bore the signature of Col. Stanton was burned.

The Toledo firm deposited the damaged warrant in the National Bank of Toledo, but when the paper was sent to Boston for collection the sub-treasury refused to honor it in that form. Col. Stanton was requested to certify on the face of the warrant that the paper was the one he had issued, but this he declined to do.

Effort was next made to have the treasury department issue a duplicate warrant, but inasmuch as the amount involved was over $2,500, this could not be done without specific authorization by Congress. This would have required months of delay, and it was suggested as an alternative that the mutilated warrant be returned to Col. Stanton and that he issue a new one to replace the original. Thus far he has not consented to accept this way out of the difficulty. The matter has now dragged along for months, and the dredging contractors have finally been impelled to enlist the services of a lawyer to present the matter before the war department in the hope of finding some solution of the deadlock.

THE PRESENCE OF GREENISH-COLORED MARKINGS IN THE FRACTURED SURFACES OF TEST-PIECES.*

BY CAPT. H. G. HOWORTH, R. A.

In November of last year the attention of the ordnance committee was drawn to the occurrence of colored defects which were at the time prevalent in test-pieces from tubes, etc., for guns. It was directed that a paper should be prepared in order that opinions might be obtained as to what extent the presence of such defects should weigh in accepting or rejecting the forgings for this purpose.

The markings in question are sometimes visible to the naked eye, but in most instances can only be detetced with the aid of a microscope or hand-glass. They vary in color, a sulphur yellow streak with greenish tinge about

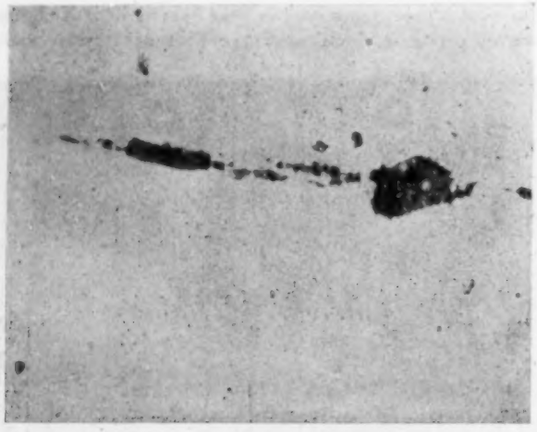


FIG. 1.—NICKEL STEEL, 13 PERCENT, JACKET. UNETCHED. Identified as green by oblique sunlight. Magnification of original photograph 110 diameters. Magnification of engraving 88 diameters.

0.03 in. broad extending right across the fracture being the most common variety. Next in order of frequency come minute leaf green markings; these are seldom massive, but occur as interrupted streaks in series. In some cases as much as 10 percent of the surface of the fracture is taken up by these. Cream and bronze-colored streaks also occur. The defects are usually elongated in the same way as the slag lines in a bar of wrought iron, but irregularly shaped patches are not uncommon.

As a rule the fractures of the test-pieces in which these defects occur are not good, but the markings have been detected in cupped fibrous pieces.

The colored matter is easily detached with a needle, either as an opaque powder or as vitreous masses. The latter are very similar, viewed optically, by transmitted light, to Siemens-Martin slag. The bed from which the matter is displaced is always bright (non-fibrous). Similar bright streaks are common in gun steel test-pieces, especially in those which show color or are under suspicion, and it is quite possible that the jar of fracture has detached the foreign matter.

Associated with the green markings in fractures are laminations, small reduction of area, external cracks in the stem, and in the worst cases the piece instead of breaking with a crack parts silently, as though it had held on for a certain time and then grown tired.

The large proportion of test-pieces in which defects have been observed will probably cause surprise, considering the high quality of gun steel, but the conditions under which inspection is carried out are all in favor of their being detected. These conditions are:

(A) For the past six months every fracture has been examined under the microscope with a magnification of 15 diameters.

(B) The test-pieces are cut transversely to the length of the forging, and therefore a streak lying longitudinally to the forging will be at right angles to the axis of the test-piece, and if it occurs in the fracture will present its largest dimensions to view.

(C) The test-pieces are cut from the ends of the forgings, and consequently most frequently from the extreme ends of the usable portion of the ingots.

(D) The forgings and ingots are large, and in no case does the reduction of area in working exceed 1 to 5.

With regard to forgings which have come under the

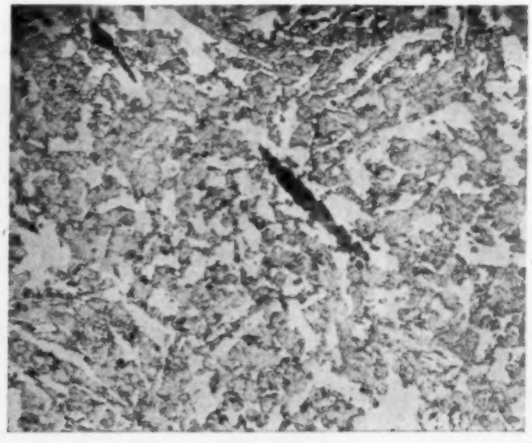


FIG. 2.—7.5-IN. INNER "A" TUBE, TEST-PIECE. Hardened at 145 degrees F., and annealed at 900 degrees F. Etched with picric acid. Identified as green by oblique sunlight. Magnification of original photograph 110 diameters. Magnification of engraving 88 diameters.

author's personal inspection, the number of sets of test-pieces showing defects is as follows:

Smaller Forgings.—Made from medium-sized ingots, forged solid under the hammer. In most cases the ingot has been cut into two blooms at least, each bloom making a forging.

Considered as Ingots.

In 1 case the defects occurred at center and top and bottom.
In 3 cases " " " top and bottom.
In 1 case " " " center and top.
In 2 cases " " " center and bottom.
In 3 cases " " " center only.
In 8 cases " " " bottom only.

In the tests from forgings from many ingots no observation was recorded, and eight complete casts, each making from three to seven ingots, were apparently free from defects.

Considered as Forgings.—At the time the first report was written, out of 85 forgings examined in 8 percent of the muzzle and 11 percent of the breech tests green markings were noted. The muzzle end of a forging in all cases represents the upper portion of a bloom or ingot.

Larger Forgings.—From ingots up to 70 tons in weight. These ingots each make one forging, which is pressed hollow on a mandrel. Of 50 forgings 5 percent of the test-pieces from the muzzle end, and 35 percent of the test-pieces from the breech end showed greenish defects.

Broadly speaking, the colored defects occur most frequently at the bottom of the ingot, and certainly, according to the author's observation, the streaks at the corresponding breech end of the forgings are much larger

*Abstract of a paper presented at the meeting of the Iron and Steel Institute, Sheffield, England, Sept. 26-29, 1905.

than those found at the muzzle. They are also more common in forgings from large ingots than in those from small.

The specification for gun steel calls for one "soft" and two final tensile and bending tests from each end of the forging; cut, with certain exceptions, transversely, so as to be tangential to the finished interior circumference.

Yield Point.	Breaking Stress.	Elongation.
21 tons per sq. in.	34 to 44 tons per sq. in.	17 percent on 2 in.

The chemical specification is as follows:

Silicon	0.05 to 0.20	percent.
Manganese	0.45 to 0.85	"
Phosphorus	not exceed 0.04	"
Sulphur	" " 0.05	"
Copper	" " 0.05	"
Carbon	0.28 to 0.40	"

The steel must be made by the acid open-hearth process.

In very few cases have the markings been detected without the aid of a miscroscope; a strong light is also necessary. The fine dark green streaks can really only be distinguished when the sun is shining. If vertical illumination (from an oil lamp) is used, the green color disappears, and the markings become slightly more leaden in appearance than the steel.

It is the author's personal opinion that this foreign matter is always present, and would be detected if sufficiently high magnification could be used.

FIG. 3.—WROUGHT IRON BAR. UNETCHED.
Magnification of original photograph 110 diameters. Magnification of engraving 88 diameters.

The greenish markings generally appear as streaks; when lamination also appears on the surface of the fracture these streaks lie parallel to the laminations. The test-pieces are marked systematically, and in every case the streaks and laminations are found to run longitudinally in the forging. One would naturally infer that if a mass of foreign matter existed in the ingot it would be drawn out in the direction of maximum extension of the metal.

Before forging some 5 percent of the ingot is removed from the bottom, and a varying amount from the top, never less than 25 percent and frequently as much as 50 percent.

Theoretically, if the ingot has been allowed to cool naturally, the impurities should rise to the upper portion, which is removed before forging, or to the central, which is avoided by the position of the test-pieces; but the steel which first falls into a cold ingot mold solidifies rapidly, and particles of foreign matter become entagled instead of being able to rise to the more fluid head.

This would seem to be the explanation of the fact that the breech ends of the larger forgings contain the most defects; the larger the ingot the lower is its casting temperature with a given steel, transverse shrinkage cracks being regarded as more dangerous than foreign matter; on taking successive discs for retests the green markings tend to become fewer in number, and the forgings from ingots from which a larger percentage has lately been removed before forging have been more satisfactory.

The final dimensions at the muzzle end of all forgings are smaller than those at the breech, more work has been put in, and everything has been more broken up.

The smaller forgings are made (solid) under the steam-hammer; the fractures of the test-pieces from these are practically all finely laminated.

The work put in by a hammer is quickly applied and is not distributed in the same way as when a slow pressure is exerted. Flow lines are formed; in fact the hammer has a breaking up effect, and the green patches are drawn out to threads and are more unlikely to be recognized in the fractures of test-pieces from these forgings than they would have been had the same steel been subjected to the slow kneading of the press. That this is so is borne out by a micro-examination of polished and etched sections.

Sections from a large number of test-pieces which had shown greenish markings in the fractures were prepared and were found to contain flaws of various sizes filled with leaden-colored matter (by vertical illumination), but it was some time before a defect sufficiently large to examine under a low power by oblique illumination (sunlight) appeared. Figs. 1 and 2 show flaws which, both before and after etching with picric acid were by oblique illumination yellow-green with lighter colored and darker areas, and by vertical illumination leaden gray. These establish the identity of the green defects in the fractures with some of the micro-flaws seen after polishing and etching; from the following consideration it appeared to be probable that they were due to slag:

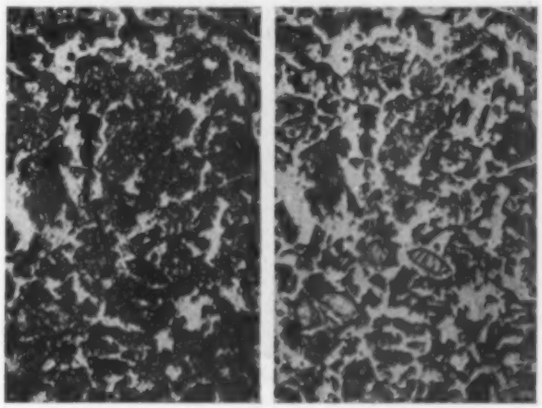


FIG. 4.—AFTER. FIG. 5.—BEFORE.
Twelve-in. A tube, muzzle end. Etched with picric acid first. Photographed after and before treatment with dilute HCl. Sulphide of manganese. Magnification of original photographs 110 diameters. Magnification of engravings 82 diameters.

1. The optical similarity between the matter in the larger defects and the slag in wrought iron (Fig. 3).
2. The similarity between a detached piece of green matter and Siemens-Martin slag by transmitted light.
3. The percentage of sulphur in gun steel would not be sufficient to account for the large quantity of greenish matter found at the bottom of large ingots.
4. The probability of slag being entangled at the bottom of the ingot.

At this point the author consulted Mr. Stead, showing him the specimen, of which Fig. 1 is a photograph. This he heat-tinted to blue; the main mass of the contents of the flaw was then light brown, whilst the two lighter-colored spots were yellow. He then placed some dilute sulphuric acid on the section as it lay under the microscope; bubbles of gas immediately arose over the light-colored spots, and on cleaning the section the contents of

the latter were found to be dissolved, whilst the main mass was untouched.

The author repeated these tests on a number of sections, and was able to confirm Mr. Stead's results. There are therefore two substances very similar optically, which others besides himself have probably considered to be one and the same.

The contents of the rounded or oval pools, which must be the dove-gray sulphide of manganese described by Prof. Arnold, are, as a rule, dissolved by dilute acid, which reagent does not act upon the defects with jagged and irregular contours. The former are lighter in color and the latter the more vitreous.

Figs. 4 and 5 show a soluble defect after and before the application of dilute hydrochloric acid. Figs. 6 and 7 show an insoluble defect under the same conditions. Fig. 8 a soluble pool in an ingot before forging. Fig. 9 the same in a forging. Fig. 10 is a large flaw filled with insoluble matter from the same section as Fig. 9. Fig. 11

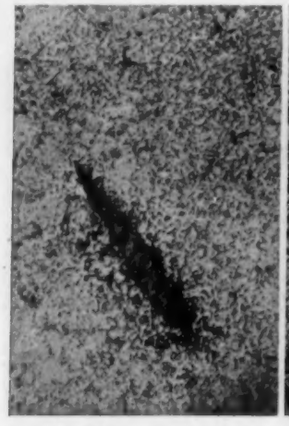


FIG. 6.—AFTER.

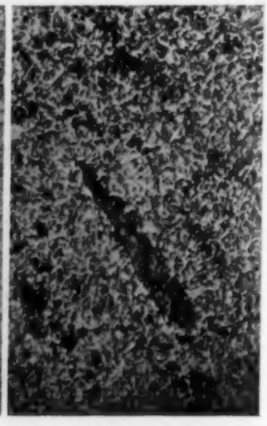


FIG. 7.—BEFORE.

7.5-in. inner A tube, breech end. Test-piece oil hardened at 1,600 degrees F., and annealed at 1,200 degrees F. Etched with picric acid first. After and before treatment with dilute HCl. Silicate of manganese. Magnification of original photograph 110 diameters. Magnification of engraving 83 diameters.

shows the soluble sulphide embedded in the insoluble matter.

Mr. Stead, by digesting two test-pieces in dilute nitric acid, was able to separate a residue; this, on analysis, approximately satisfied the formula for sesquisilicate of manganese. He also showed the author a slide containing some of the separated particles, which were of all shapes, and showed the rounded holes which had held sulphide of manganese. A second analysis which Mr. Stead has sent is as follows:

From a Patch of Olive-Green Slag in the Center of an Axle.

	Percent.
Silica	46.61
Protoxide of manganese	48.08
Alumina	3.39
Oxide of iron, etc.	1.92
	100.00

The author is indebted to Mr. Braithwaite for the following information: Having separated the silicate from some plates, he found 0.027 percent in one case and 0.02 percent in another, both bad plates, the silicate approximating to the formula $MnOSiO_2$, whilst in a good plate he found only 0.005 percent of residue, and this approximated to the composition $(MnO)_2(SiO_2)_2$.

At the Royal Arsenal a number of small nickel steel forgings obtained from outside makers have lately been rejected for ghosts and longitudinal flaws. A careful examination of some 50 nickel steel forgings here has ended in one only being found to contain similar defects; in this for about 2 ft. on the exterior of the barrel, and over a space about 1 in. wide, were a number of very fine longitudinal marks, none more than a quarter of an inch long, but lying in prolongation of each other. In this particu-

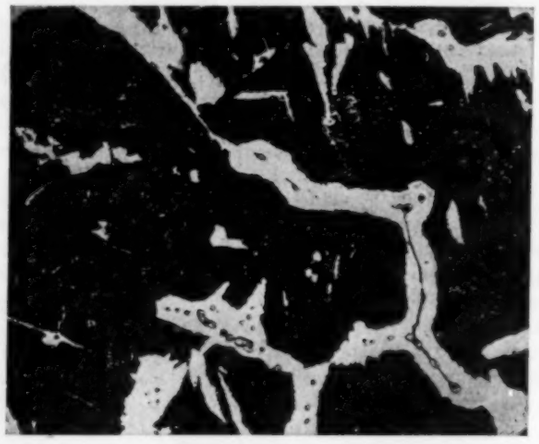


FIG. 8.—TOP OF A 27-TON INGOT.

Etched with picric acid. Magnification of original photograph 110 diameters. Magnification of engraving 85 diameters.

lar forging the marks could only be picked up by using a hand-glass after it had been fine turned and polished with emery paper. As they disappeared when another one-tenth of an inch was taken off, the forging was accepted.

Before this was done the author was able to distinguish the green color in one of the broadest streaks, and to have it chipped out. Fig. 12 is a photograph of this; unfortunately the metal was "set up" in chipping, and in fine polishing the contents of the flaw have been almost all swept out.

Fig. 13, another chipping, shows one of the fine defects, which is of silicate; green streaks had appeared in the test-pieces from this forging.

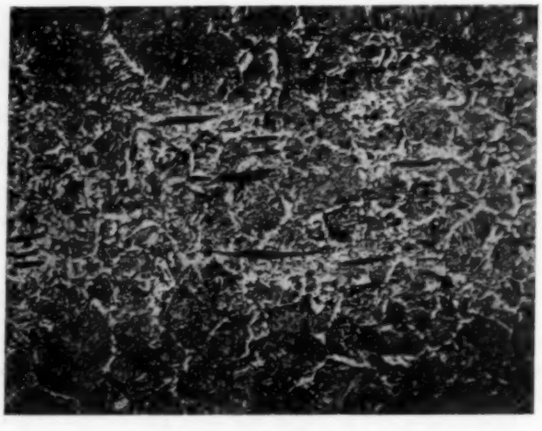


FIG. 9.—NICKEL STEEL, 13 PERCENT, "A" TUBE, MUZZLE END. SULPHIDE STREAKS IN A GHOST.

Etched with picric acid. Magnification of original photograph 110 diameters. Magnification of engraving 85 diameters.

Some doubt has been cast on the good character of nickel steel in consequence of these failures, but the author's observations show that an abnormally small percentage of the test-pieces from nickel steel forgings show greenish markings, and the forging mentioned above was the only one on which exterior defects could be found.

If, then, as seems most probable, the greenish markings on the fractured surfaces of test-pieces are due to the same matter that causes the longitudinal and interrupted de-

fects in the forging, they should surely be taken serious notice of, when present in quantity. If the defects are seen in the fractures of more than one test-piece in a forging, they are in all probability thickly distributed.

The streaks are never individually very long, but occasionally they extend from one side of the test-piece to the other (0.564 in.); more frequently they are broken up into

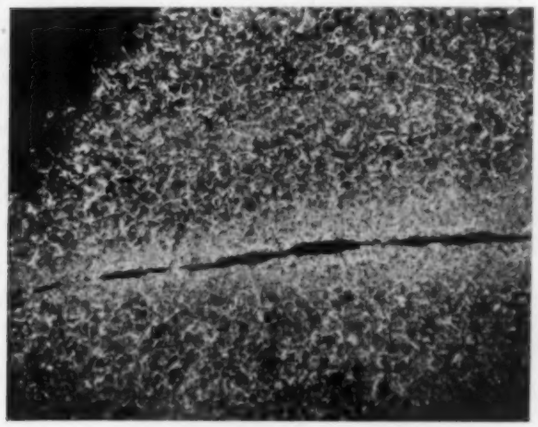


FIG. 10.—NICKEL STEEL, 13 PERCENT, "A" TUBE MUZZLE END. LARGE FLAW LYING ON A GHOST.

Etched with picric acid. Magnification of original photograph 20 diameters. Magnification of engraving 15½ diameters.

quite short flaws lying in prolongation of each other with the metal welded up between them.

The effect on the tensile strength of the test-piece is little beyond what might be well accounted for by the consequent reduction of area.

The effect on elongation is marked if the streaks are visible to the naked eye. The locus of the defects reaches its maximum in the very worst place, i. e., at the breech end of a large forging. In the inner tube it is at the front

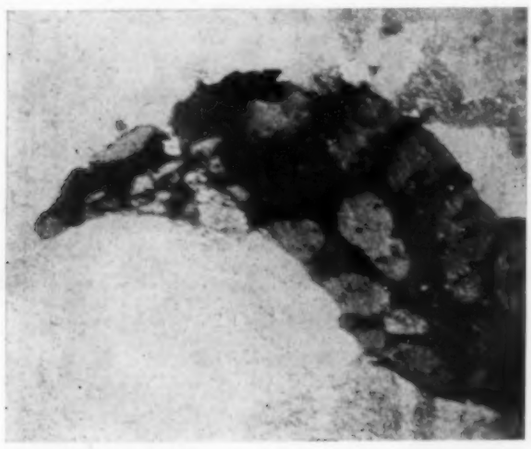


FIG. 11.—9.2-IN OUTER "A" TUBE, BREECH END.

Sulphide of manganese embedded in silicate. Etched with picric acid. Magnification of original photograph 1,200 diameters. Magnification of engraving 900 diameters.

end of the chamber, where erosion commences under normal conditions, and these defects running longitudinally, whilst they may or may not develop into cracks, will, in all probability, form the starting-points for erosion. The life of a modern gun is already far too short, and anything tending to further reduce it must be condemned. In any forging subject to violent alternating stresses these flaws in prolongation may easily develop into cracks.

MAKING A MACHINIST.

BY HARRY MALONE.

Recently the writer was visiting a large plant in a town which is becoming well known as a manufacturing center, but is situated in the center of a large agricultural district and some distance from other manufacturing points. Considerable trouble has been experienced in securing suitable help and, hence, the management hit upon a bright idea of employing country boys and teaching them the trade. Quite a number of big country fellows who came in did not stay very long, and the management could not see why it was impossible to make machinists out of them. It finally developed that there was a form of initiation going on in the shop which was certainly interesting. There was a little Englishman in the plant who had one time trained for a lightweight pugilist and was a remarkably good boxer. He was an inoffensive looking fellow and not quarrelsome, but enjoyed a good scrap. When a big raw-boned farmer boy came in and began to get somewhat chesty, some of the boys would get exceedingly chummy

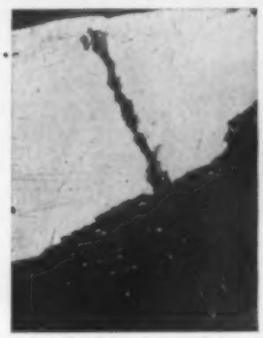


FIG. 12. FIG. 13.
CHIPPING FROM A NICKEL STEEL TUBE FOR FIELD-GUN.
CHIPPING FROM A NICKEL STEEL TUBE FOR FIELD-GUN.
BY HARRY MALONE.

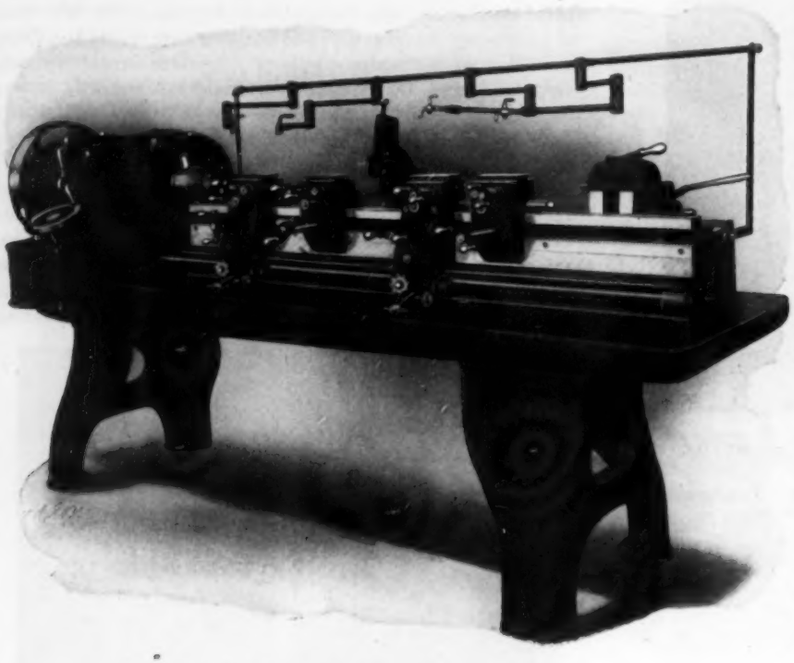
Magnification of original photograph 110 diameters. Magnification of engraving 47 diameters.

with him and tell him that he must make his mark in the shop, but he would not succeed unless he licked the one he got into a fight with. They would tell him he was sure to get into a fight with somebody, and, if he licked the fellow, everything would come out all right, but if he did not lick him, everybody in the shop would make life miserable for him until he would have to go. They would praise the fellow's size and strength and tell him that he surely ought to come out on top if he ever went into a scrap. By and by, during the noon hour, they would get the little Englishman against the country fellow, and it was usually easy to get the big fellow to pick a quarrel with the little one. Some fellow would then propose that just for fun they put the gloves on and settle it. The little fellow would tell the big fellow that he must not be too hard on him and they would get at it. By the time they got through the big fellow would have had a thorough licking and never know how he got it from the fellow in the shop. The men would then devil the life out of him and say, "Why, if you cannot lick the smallest fellow in the shop, you cannot be much of a man. What will you do if you get into a fight with a good fellow?" This bantering would hit the farmer boy in his weak spot, as it affected his pride, and sooner or later he would go out. In this way lots of good fellows were driven out of the shop.

It is a question what would be best to do in such a case as this, but it seems that the superintendent should get in touch with his men and regulate the matter so that it would not drive bright, intelligent men out of the shop.

THE "LO SWING" LATHE.

The Fitchburg Machine Works, Fitchburg, Mass., has recently placed on the market the lathe shown in the accompanying illustrations. This lathe is called the "Lo Swing" lathe and is for turning on centers only. It is not for chuck work or for screw cutting or any other purpose than plain turning. It has two distinctive features; First: Very low swing, just enough to clear a 3½ in. bar; and, second: single slide tool carriages, several of which may be simultaneously employed.



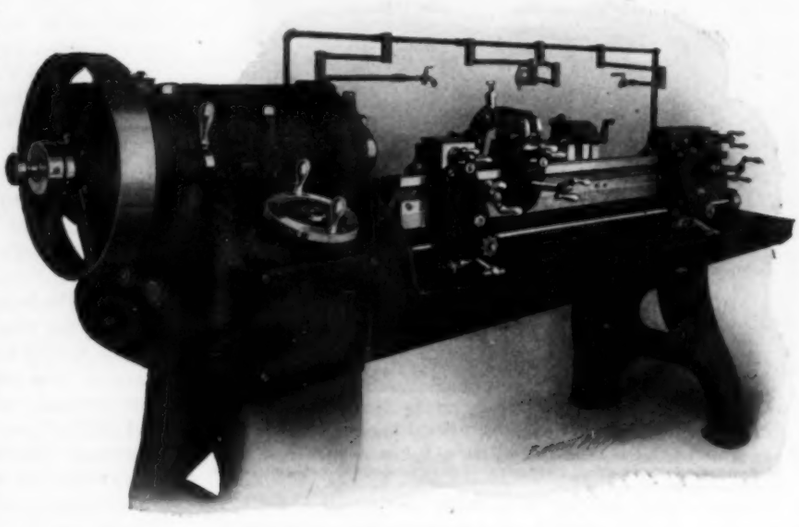
"LO SWING" LATHE, SHOWING TOOL CARRIAGES.

The lathe is provided with fixed and following back rests and steadies, to give requisite stability to even the most slender work. Furthermore, the use of back rests in connection with the center point scheme of turning gives the most satisfactory results. Heretofore the turret lathes have used the back rest scheme and the engine lathes the center point scheme of support with occasionally a more or less convenient follow rest for special work, but in this lathe it is made a regular feature that may be quickly brought into or thrown out of use, as required by the work.

The cutting tool is a piece of high speed steel machined to fit closely a ⅝-in. x ¾-in. hole in the tool holder. The cutting end projects just enough beyond the tool holder to meet the requirements of the work. The cutter is caused to slide in and out of its holder by the adjusting screw which is conveniently operated by a handle. The tool is held firmly into its work by the adjusting screw, the end of this screw bearing against the inner end of the cutter. The inner end of the cutter is notched to receive a yoke that carries it back with the adjusting screw when the screw is retracted. Thus the cutter may be adjusted for depth of cut the same as any tool in the standard lathe, but with the difference that the screw which controls it, takes its bearing against the end of the tool instead of several inches below it. Furthermore there is no slide that can yield and allow the tool to change its position independent of the screw. The cutter does not require any building or clamping in its holder since the cutting stress holds it firmly in its seat and against the adjusting screw. The cutter holder with its cutter, and the adjusting screw and handle may be instantly removed from its socket in the carriage, by releasing clamp. There are two sockets on top of the carriage, into either of which the cutter may be clamped. The mechanism for clamping the cutter holder in either of these holes or sockets consists of a short plug which occupies a hole drilled across the two sockets and an eccentric plug that is placed in the socket that is not used by the tool holder. Turning this eccentric plug forces a short plug against the tool holder, thus firmly locking it in position. By means of this convenient scheme for quickly binding or releasing the tool holder, the lathe hand may quickly change from one tool holder to another, either for sharpening purposes or to insert some other form of tool that may be required for the work.

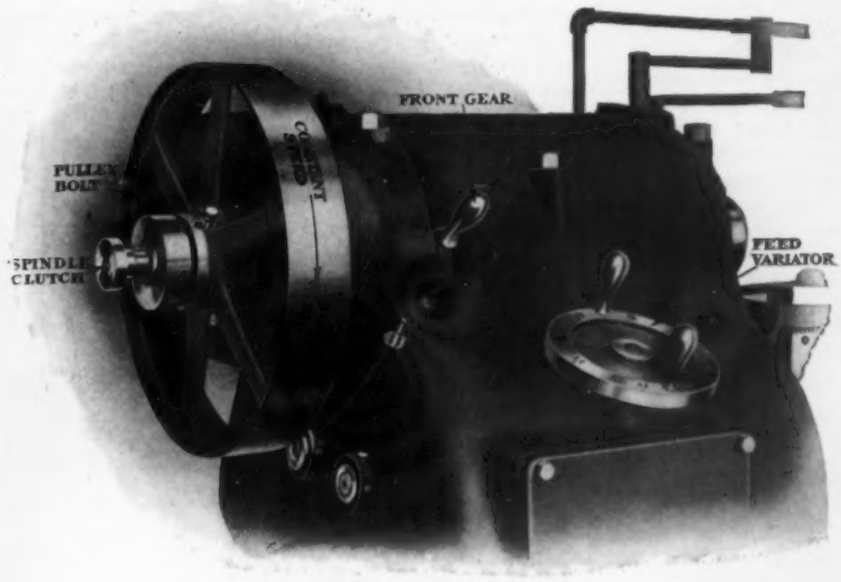
The carriage may be described as a single block of metal fitted to slide on a rectangular guide rail, and to carry a cutting tool just as close to the guide rail as possible; the guiding rail and sliding block are so formed that the cutting strains are squarely borne by the guiding rail. The block is provided with the necessary gears for feeding and quick traverse.

On this lathe two types of carriages are provided; one equipped with gears for power feed and the other is without power feed gears. Both are provided with handles for traverse by hand, also a connecting bar by which the carriages without feed may be fed in connection with the power feed carriages. The regular lathe is provided with two of each, though a greater or less number may be used according to the nature of the work. These carriages are lighter, more



"LO SWING" LATHE, SHOWING FOLLOWER RESTS.

convenient and more stable than the usual carriage on engine lathes. Their width being only 5 in. instead of the usual 2 ft., gives an opportunity to bring into simultaneous operation of tools on nearly all work of say over 8 in. long Although these carriages are only 5 in. wide they have large relative area of bearing surfaces on the guide rail when their weight is considered. These carriages weigh only 40 and 60 lb. respectively, whereas the carriage of an 18-in. engine lathe



HEADSTOCK OF "LO SWING" LATHE.

will weigh at least 260 lb. and often more, thus effecting a considerable saving.

The lathe is provided with two roller follower rests which may be quickly attached to any of its carriages. In addition to these follower rests there are supplied with each regular machine two roller center rests which may be fixed rigidly to the bed at any position between the head and tail centers. The carriages pass these center rests the same as they pass the tailstock. These rests contribute greatly to the efficiency of the lathe by combining the center scheme of support, which is used in the standard lathe, with the back rest scheme of the turret lathe.

The main frame or bed of the machine is a single casting which forms the guide rail on which the carriages slide, the drainage pan for chips and oil, and the casing for enclosing the spindle and gears.

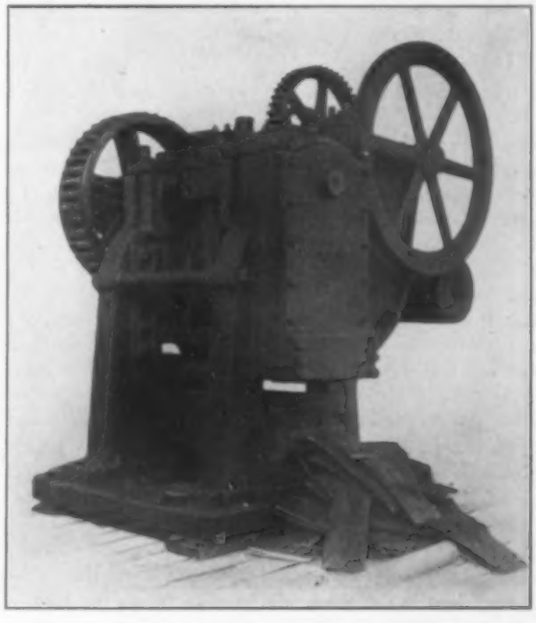
The headstock is a part of the bed casting and is provided with all the necessary gears to obtain seven changes of speed. All the changes are effected by clutches and other mechanism, which may be quickly and conveniently operated, but for operating which it is necessary to stop the machine. The object of omitting the feature of instant change of speed while running was for the purpose of avoiding every unnecessary complication. The gears and clutches for changing the speed of the spindle run in oil, insuring perfect lubrication of all the running parts.

The pulley is 8 in. in diameter by 3-in. face. It runs at a constant speed of 560 revolutions per minute. The spindle speeds range from 560 to 50. The pump for furnishing oil for cutting tools is in the head end of the machine and gets its power from the main pulley. It takes the oil from the reservoir under the head and delivers it to the cutting tools, after which the oil flows back to the reservoir. The machine may be belted to a constant speed motor placed on the floor or to a countershaft overhead.

PIPE CRUSHING AND SHEARING MACHINE.

The United Engineering & Foundry Co., Pittsburg, Pa., has recently bought out the pipe crushing and shearing machine shown in the accompanying illustration. This machine is designed to crush and shear wrought iron and steel pipe in one operation. This work is usually done with two separate machines. The pipe is first flattened under a steam or drop hammer and then sheared up in another machine to the proper length. The machine illustrated herewith completes both operations at the same time, thus effecting a large saving in handling material, and only one-half the labor and power is required. When it is desired to crush and shear the pipe the operator feeds the material in at one end of the machine. The first stroke of the press flattens the pipe and it is then pushed forward and the second stroke shears off the flattened end and crushes the part of the pipe immediately under the die. Another advantage is that the pipe can be crushed without shearing by simply feeding into the side of the machine instead of the end.

All gearing and driving mechanism is overhead, and there is a free space around the entire machine for the operator to work in. This facilitates the operation and renders easy the handling of the material. The crushing dies and shearing knife are driven by means of cranks from the main shaft, which in turn is driven through heavy gearing from the engine or motor. The machine is of heavy construction, all parts being of ample size to insure great strength and rigidity,



PIPE CRUSHING AND SHEARING MACHINE.

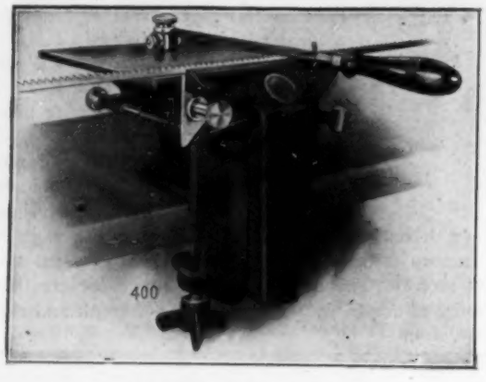
so that the machine will stand rough usage and not require skilled labor to operate it. It may be driven either by steam, belt or electric power with the engine or motor direct connected.

THE NEW-BRITAIN BAND SAW FILER.

In its new band saw filer the New Britain Machine Co., New Britain, Conn., has reduced the care and skill exercised by the expert hand filer to a mechanical basis. The angle of the cut, the direction of the stroke, and the amount of hook in the teeth are all accurately determined by means of set screw and guide. All that is required of the operator is that he set the file at the proper angle and keep the roller guide in contact with the guide plate and that the direction of the stroke be fairly constant. The essential features of the device are a pair of anti-friction rollers, to support the end of the file and a level plate to guide the rollers, the combination insuring a square cut across the saw at every stroke of the file. An arrangement for locking the file against rotation, thus fixing the angle of the teeth, and an adjustable automatic clamp vise are auxiliary but important features.

The filer weighs but 14 lb. packed in a box, 11 x 10 x 7½ in. It may be clamped to any bench whose top is not over 2 in. in thickness, and it is claimed that a light band saw filed on it and set by the firm's "equal blow" method will resaw a ⅞-in. board into twelve thicknesses.

It is recommended that before the dull saw is removed from the machine a bit of stone or emery be held against the teeth. This removes the points of the teeth uniformly



NEW-BRITAIN BAND SAW FILER.

and thus forms a guage for filing each tooth in order that all may cut.

The work of the filer is said to retain all of the advantages of expert hand filing, etc. A further advantage is the possibility of filing the top of the tooth last which does not "throw up the burr" at right angles to the direction of the saw's cut, which is the result of filing the front of the tooth last.

The vise holds saws up to 1-in. in width and all thicknesses from No. 24 to No. 18. Stub's gauge. The clamping is automatic; after the saw is dropped into place it is held firmly and no chattering is possible. The file feeds the saw by simple pressure on the part of the operator from left to right. The hardened vise jaws yield against the pressure and automatically tighten after the pressure is removed. All saws but the heaviest may be placed upon the bench back of the filer in three coils and fed by the file as described.

The grip of the hand screw which clamps the device to the bench top is an interesting illustration of the care and skill exercised in designing and manufacturing the filer. The usual small hand wheels and two- and four-winged grips were tried and rejected as not affording a satisfactory hold. Various other forms modeled from putty were studied and the present shape was finally selected as being the most grateful to the hand in all possible positions. The top of the guide plate is milled off to a true surface.

A NEW METHOD FOR MAKING CRANK SHAFTS.

The Espen-Lucas Machine Works, Philadelphia, Pa., has recently brought out a machine for making crank shafts. This machine, which is shown in the accompanying illustrations, bids fair, according to the maker, to revolutionize the manufacture of this article. The method of manufacturing crank shafts, in general, has always been more or less unsatisfactory. The piece is first forged to the shape shown in Fig. 1. A large mass of metal must be removed from the center of this forging in order to form the pin. Usually this work has been done by drilling holes across the web and then cold-sawing to meet the holes. The lump is then broken out from the throw, a rough square pin resulting. The next operation was the centering of the pin and shaft in a lathe balanc-

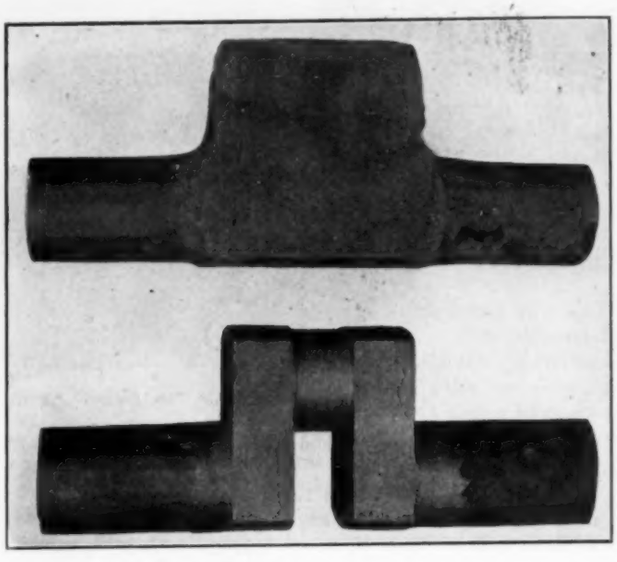


FIG. 1.—THE ROUGH FORGING AND THE FINISHED CRANK.

ing the forging with jigs so that the pin could be turned up. To finish the cheeks of the crank a powerful milling machine has generally been used. This method involved a great deal of work and considerable time was lost in shifting the work to and from the different machines.

The machine shown in the accompanying illustrations is stated to have turned out the crank shaft in Fig. 1 from the rough forging, shown in the same figure, in one hour and thirty minutes. It took out the throw, turned off the ends and sides of the cheeks, and turned up and finished the outside of the cheeks. It then faced off the top and bottom of the crank. This is remarkably fast work and was made possible by the crank being held firmly vertical in the machine, thereby avoiding the rise and fall of the heavy lump from which the throw was made, when it is turned in a horizontal position as in a lathe.

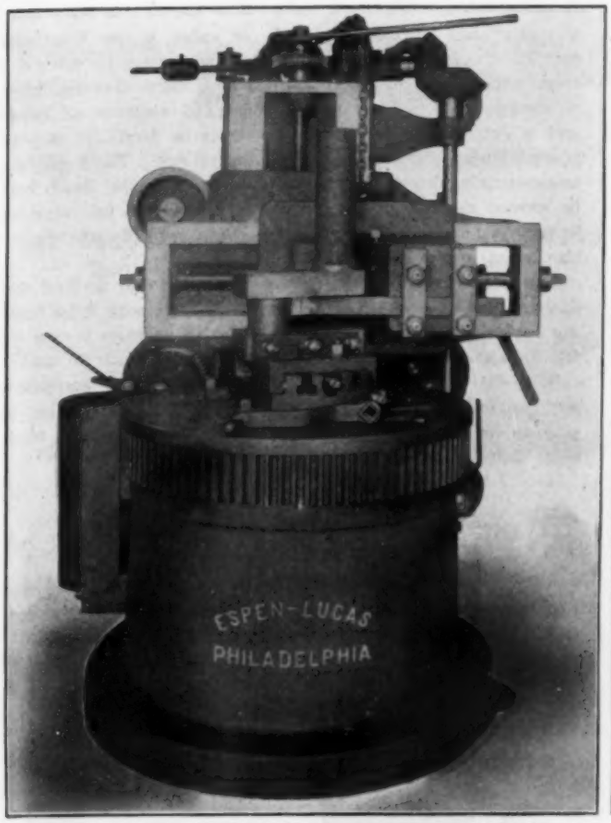
The machine shown is furnished with a patent universal vise for roughing out and a stationary device for finishing the crank shaft. The vises are easily adjusted to different sizes of crank shafts by means of a scale on the table which shows the different settings for different sized crank shafts.

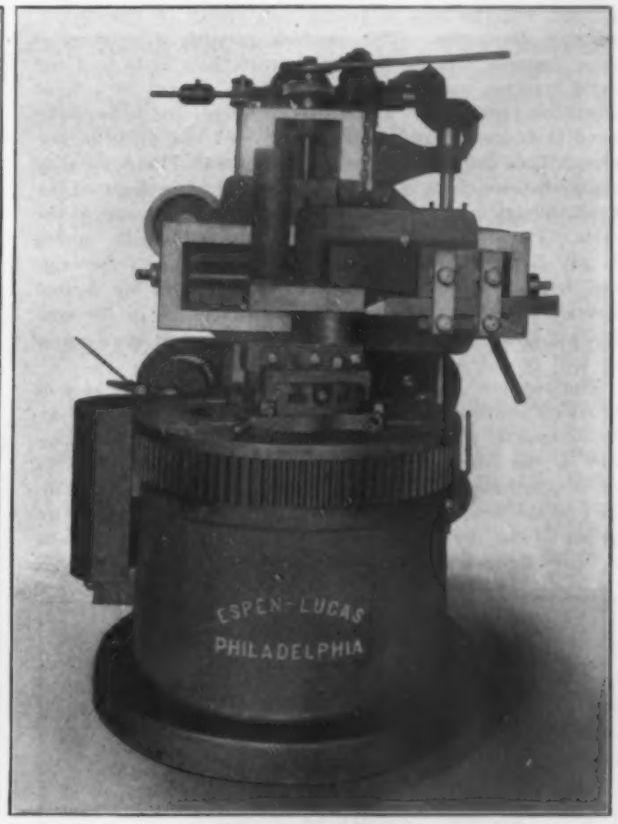
The machine illustrated has a capacity for roughing out and finishing crank shafts with 20-in. throw or smaller.

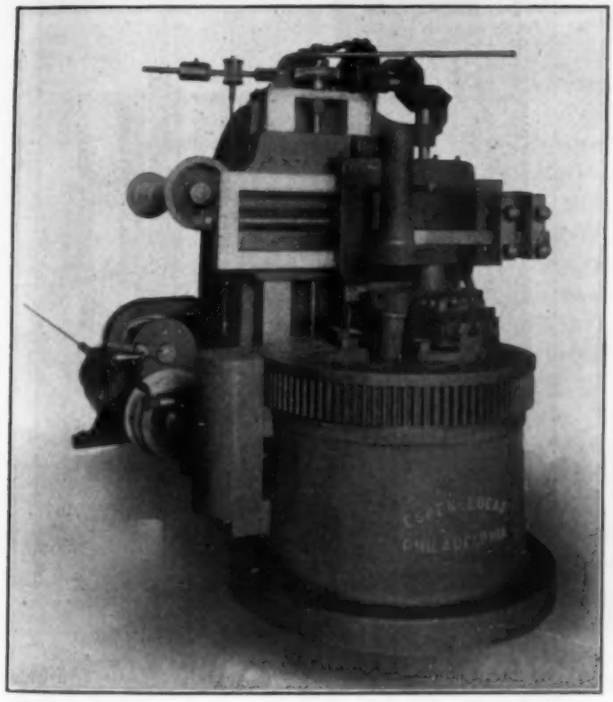
Fig. 2 shows the machine roughing out the throw, making a crank shaft from the lump forging. The tool shown

is 2½ in. wide. Fig. 3 shows the machine turning and finishing the outside of the cheeks. Fig. 4 illustrates the operation of turning up the ends of the cheeks, while Fig. 5 illustrates the finishing of the endsides of the cheeks.

The machine has automatic feeds in all directions and is extremely powerful. The gears are of hammered crucible steel and the bearings are lined with bronze. The tool complete with all equipment has a total weight of about 20,000 pounds.







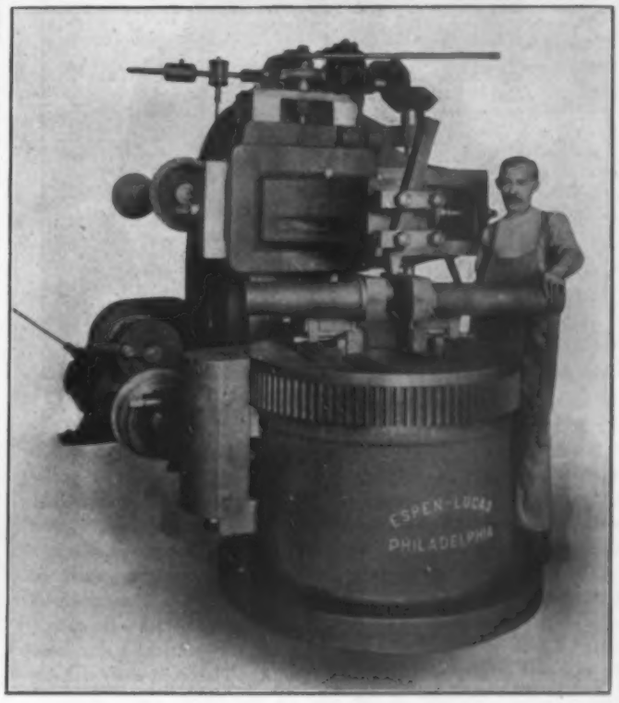


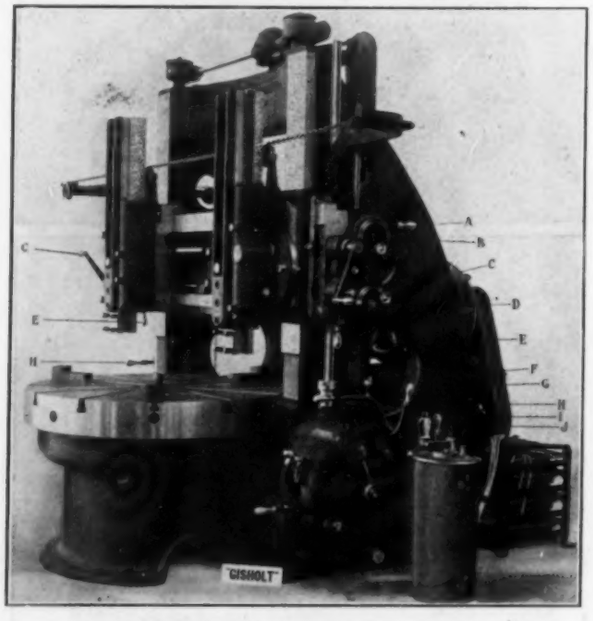
FIG. 2.—ROUGING OUT AND FINISHING THROW OF CRANK.
FIG. 3.—TURNING OUTSIDES OF CHEEKS OF CRANK.

FIG. 4.—TURNING ENDS OF CHEEKS OF CRANK.
FIG. 5.—FINISHING ENDSIDES OF CHEEKS OF CRANK.

A 52-INCH VERTICAL BORING MILL.

The Gisholt Machine Co., Madison, Wis., has recently brought out the vertical boring mill shown in the accompanying illustration. This machine presents a number of novel features. All the head movements, both as to feed and rapid traverse, are made, by power, the absence of a hand wheel being noticeable. The feeds may be operated, however, by hand if desired. The heads are swiveled and made in one piece. They can be set to any angle desired. The down slide counterbalance chain is led behind instead of in front of the head, thus giving the operator free access to the center of the table. The heads may be independently and rapidly moved in any direction by power without interfering with the original feed as set. When the head is moved to the desired position by the rapid moving device the release of the controlling lever operates at the same time to reset or continue to feed or not as desired.

The machine has 10 changes of feed. A positive stop is provided which brings the center of the down slide to coincide exactly with the center of the table. A valuable feature is the introduction of a friction device which may be made practically positive in its action and which prevents injury to the feed mechanism, resulting from the jamming together of the heads through careless operation. The spindle is driven by spur gears and is very powerful, the spindle itself



GISHOLT 52-INCH BORING MILL.

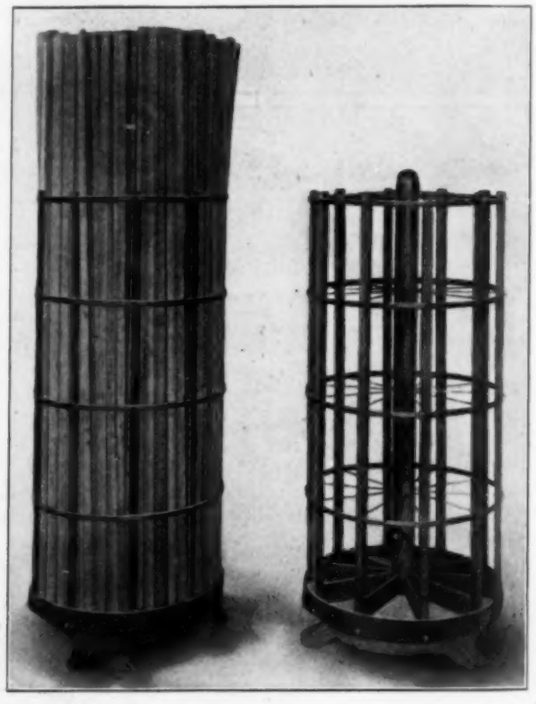
resting upon a broad self-oiling babbitted bearing. The cross-rail is raised and lowered by power. The table is fitted with three movable top jaws. If desired, however, face plates with independent jaws may be substituted. The use of the different levers as shown in the illustration are as follows:

Lever A is for raising or lowering the cross rail used in conjunction with lever I, on the controller. The vertical trip dials located on both ends of the cross rail are designated by B. By the use of these dials the vertical feeds may be stopped at any predetermined point. The feed also will be automatically stopped at the end of the down slide traverse. The cranks for moving the head by hand are shown at C. D is the feed trip dial controling all horizontal feeds in the same manner as dial B. This dial is located on either end of the cross rail. The feed engaging lever for either vertical or horizontal feeds is shown at E. By the use of this lever the feeds may also be reversed or stopped. F is the lever for controling the sliding gears in the headstock. This lever has three positions; forward, middle and backward, giving respectively medium, high and low speed to the table. G is the friction headstock lever. The use of this lever is to instantly start or stop the table or move it any fractional part of a revolution. All table movements can be controled from either side of the machine. The rapid traverse lever is shown at H. This lever controls all motions of heads and is entirely independent of the table or feed. It may be operated with the table in motion or at rest. The feeds are automatically disengaged by this lever, and the head may be moved rapidly in the desired direction and on releasing it the feed will be automatically continued. Practically no movement of the heads by hand is necessary.

The heads are absolutely independent both as to feed and direction. The entire machine is constructed with large bearing surfaces and the tool as a whole in all its parts presents a stantial appearance. A feature of this mill to which the maker calls special attention is that a variable speed motor equipment with an increase of 50 percent above normal is sufficient to give an ideal arrangement of speeds. This results in a moderate cost for motor equipment.

A RACK FOR PATTERN FILLETS.

John O. Brodin, 1116 West Sixteenth street, Chicago, Ill., manufactures the rack shown in the accompanying illustration. This rack is intended to hold fillets for patternmakers so that the edge will not be broken off. The rack is made in one size only, 17 in. in diameter and 39 in. high.



RACK FOR PATTERN FILLETS.

The rack itself is made of wood and contains ten compartments and will hold about 3,000 ft. of different sized fillets. It revolves about a vertical spindle at the center. The upper portion revolves on roller bearings which are encased in the tripod legs. The vertical slats comprising the compartments are held together by bands of hoop steel.

The manufacturer of this rack also makes wooden fillets for patternmakers in sizes from 3-16 to 2 in.